DEPARTMENT OF TRANSPORTATION U.S. COAST GUARD CG-3303C-19 (Rev. 05-00)

### RECORD OF PERFORMANCE QUALIFICATIONS AMT

#### **INSTRUCTIONS**

Record of Performance Qualifications shall be completed for enlisted personnel of the Coast Guard and Coast Guard Reserve as outlined in the Enlisted Qualifications Manual (COMDTINST M1414.8, series). As proficiency in each performance qualification is demonstrated, the DATE and INITIALS column shall be completed. Personnel are required to demonstrate proficiency in all new qualifications assigned to their rating. Qualifications previously demonstrated, dated and initialed off will not be recertified.

Prior to commencement of ADT, the member's unit shall indicate, by circling in red, those qualifications which cannot be completed during inactive duty and should be completed on ADT.

RATING			ABBREVIATION
Aviation Maintenance Technicia	n. This edition is effective f	for the May 2001 SWE.	AMT
DATE COMPLETED ALL PERFORMANCE	QUALIFICATIONS FOR RATE LEVE	L .	
E-4	E-5	E-	6
E-7	E-8	E-	.9
NAME (Last, First, Middle Initial)			SOCIAL SECURITY NUMBER

SIGNATURE OF SUPERVISOR					
DATE	NAME/SIGNATURE	INITIALS	RATE	UNIT	
REMARKS					

CG-3303C-19 RATING: AVIA	(Rev. 05-00) (Effective for the May 2001 SWE) ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
PERFOR	MANCE QUALIFICATION FOR ADVANCEMENT		
Major Dut	y: A. Administrative Duty		
Task:			
5.A.01c	QUALIFY in assigned aircraft as a Basic Aircrewmember IAW the Coast Guard Air Operations Manual COMDTINST M3710.1 (series).		
5.A.02c	<b>ORDER</b> aircraft parts IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
5.A.03c	<b>AUDIT</b> technical publications and directives IAW the Technical Information, Management and Ordering System (TIMOS) User Process Guide, CGTO PG-85-00-50.		
5.A.04c	<b>SUBMIT</b> aircraft publication change requests IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), CG-22 Process Guide, CGTO PG-85-00-20, and local station instructions.		
5.A.05c	<b>PREPARE</b> the required forms for the Joint Oil Analysis Program (JOAP) IAW the JOAP Manuals, NAVAIR 17-15-50 (series) or for the Spectrometric Oil Analysis Program (SOAP) IAW the ATF3-6 Maintenance Manuals.		
6.A.01c	<b>REVIEW</b> discrepancy information from aircraft records and <b>DETERMINE</b> appropriate action IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
6.A.02c	PROCURE parts, tools, and other materials IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Small Purchase Handbook, COMDTINST M4200.13 (series).		
6.A.03c	PREPARE shop and aircrew training schedules IAW the Coast Guard Air Operations Manual, COMDTINST M3710.1 (series) and the Training and Education Manual, COMDTINST M1550.1 (series).		
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RATING: AVIA	TION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
6.A.04c	DIRECT personnel in the safe handling and disposal of hazardous material IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1(series), the Safety and Environmental Health Manual, COMDTINST M5100.47 (series), applicable Material Safety Data Sheets (MSDS), and state and local regulations.		
6.A.05c	<b>ANALYZE</b> Aviation Computerized Maintenance System (ACMS) component history data to identify trends and problem areas IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
6.A.06c	ORDER technical publications, directives, and manuals applicable to rating IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1(series), the Directives, Publications, and Reports Index, COMDTNOTE 5600, and the Technical Information, Management and Ordering System (TIMOS) User Process Guide, COTO P0-85-00-50.		
7.A.01c	ESTABLISH local safety procedures and standards for unit Aviation Engineering Department IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Safety and Environmental Health Manual, COMDTINST M5100.47 (series).		
7.A.02c	MANAGE rate-related Aviation Computerized Maintenance IAW the ACMS User's Guide, CGTO PG 85-00-10 and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
7.A.03c	PREPARE aircraft reports IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
7.A.04c	<b>REVIEW</b> completed maintenance forms for compliance with Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1(series).		
7.A.05c	<b>DESCRIBE</b> the procedures for preparing a Unit Training Plan IAW the Training and Educational Manual, COMDTINST M1500.1 (series) and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
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RATING: AVIA	(Rev. 05-00) (Effective for the May 2001 SWE) ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
7.A.06c	MANAGE shop inventory processes IAW applicable publications.		
7.A.07c	PROCESS aircraft for receipt and transfer IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Coast Guard Air Operations Manual, COMDTINST M3710.1 (series)		
8.A.01c	<b>REVIEW</b> applicable rating qualification codes and SUBMIT recommendations to the applicable Force Manager (G-SRF) IAW the Coast Guard Qualification Codes Manual, COMDTINST M1414.9 (series).		
8.A.02c	<b>REVIEW</b> unit aircrew flight requirements IAW the Coast Guard Air Operations Manual, COMDTINST M3710.1 (series) and the Coast Guard Pay Manual, COMDTINST M7220.29 (series).		
8.A.03c	<b>REVIEW</b> unit personnel qualification codes and UPDATE the Personnel Management Information System (PMIS) database IAW the Qualifications Codes Manual COMDTINST M1414.9 (series).		
8.A.04c	<b>MANAGE</b> unit Aviation Engineering personnel duty assignments IAW station instructions and standing orders.		
8.A.05c	MANAGE unit Aviation Enlisted Assignment Process IAW the Personnel Manual, COMDTINST M1000.6 (series).		
8.A.06c	PREPARE budget requests IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), the Manual of Budgetary Administration, COMDTINST M7100.3 (series) and station instructions.		
8.A.07c	<b>REVIEW</b> unit Personnel Allowance List (PAL) to ensure it reflects unit staffing needs IAW the Enlisted Qualifications Code Manual, COMDTINST M1414.9 (series) and the Coast Guard Staffing Standards Manual, COMDTINST M5312.11 (series)		
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RATING: AVIA	ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
9.A.01 c	<b>REVIEW</b> rate-related performance qualifications and SUBMIT written recommendations to the applicable Force Manager (G-SRF) IAW the Enlisted Qualifications Manual, COMDTINST M1414.8 (series).		
Major Dut	y: B. Aircraft Maintenance		
Task:			
4.B.01	ANALYZE aircraft hydraulic systems to the component/wire level IAW the Aviation Hydraulic Manual, NAVAIR 01-1A-17; the Aviation Hose and Tubing Manual, NAVAIR 01-1A-20; and applicable \ publications.		
4.B.02	<b>ANALYZE</b> aircraft fuel systems to the component/wire level IAW applicable publications.		
4.B.03	<b>ANALYZE</b> aircraft lubrication systems to the component/wire level IAW applicable publications.		
4.B.04	<b>ANALYZE</b> aircraft landing gear systems to the component/wire level IAW applicable publications.		
4.B.05	<b>ANALYZE</b> aircraft brake systems to the component/wire level IAW applicable publications.		
4.B.06	<b>ANALYZE</b> helicopter powertrain systems to the component/wire level IAW applicable publications.		
4.B.07	<b>ANALYZE</b> aircraft propeller systems to the component/wire level IAW applicable publications.		
4.B.08	<b>ANALYZE</b> aircraft powerplant systems to the component/wire level IAW applicable publications.		
4.B.09	<b>ANALYZE</b> aircraft Auxiliary Power Unit (APU) systems to the component/wire level IAW applicable publications.		
4.B.10	<b>ANALYZE</b> aircraft environmental control systems to the component/wire level IAW applicable publications.		
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RATING: AVIA	ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
4.B.11	ANALYZE aircraft start systems to the component/wire level IAW		
4.0.11	applicable publications.		
4.B.12	<b>ANALYZE</b> flight control systems to the component/wire level IAW applicable publications.		
4.B.13	<b>ANALYZE</b> electrical/electronic controls of aircraft engines to the component/wire level IAW applicable publications.		
4.B.14	<b>ANALYZE</b> aircraft anti-ice/de-ice systems to the component/wire level IAW applicable publications.		
4.B.15	<b>ANALYZE</b> aircraft fire protection systems to the component/wire level IAW applicable publications.		
4.B.16	<b>ANALYZE</b> aircraft flotation systems to the component/wire level IAW applicable publications.		
4.B.17	<b>ANALYZE</b> aircraft hoist systems to the component/wire level IAW applicable publications.		
4.B.18	<b>INSPECT</b> aircraft stainless steel cable assemblies IAW the Aircraft and Missile Structural Hardware Manual, T.O. 1-1A-8 and applicable publications.		
4.B.19	<b>SAFETY WIRE</b> and <b>SHEARWIRE</b> aircraft equipment IAW the Aircraft Electric and Electronic Wiring Manual, NAVAIR 01-1 A-505 (series) and the Aircraft and Missile Structural Hardware Manual, T.O. 1-1A-8.		
4.B.20	<b>REPAIR</b> damaged and broken aircraft electrical wires, cables, and connectors IAW the Aircraft Wiring Manual, T.O. 1-1A-14 and the Aircraft Electric and Electronic Wiring Manual, NAVAIR 01-1A-505 (series).		
4.B.21	<b>UTILIZE</b> test equipment to ISOLATE faults in basic aircraft electrical circuits IAW applicable publications.		
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RATING: AVI	ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
4.B.22	<b>REMOVE</b> corrosion from aircraft structures and electrical components IAW the Aircraft Weapons Cleaning and Corrosion Manual, NAVAIR 01-1A-509, the Avionics Cleaning and Corrosion Control Manual, NAVAIR 16-1-540, and applicable publications.		
5.B.01c	COMPLETE special inspections of aircraft and aviation equipment IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Aviation Computerized Maintenance System (ACMS).		
5.B.02c	COMPLETE authorized modifications of aircraft and aviation equipment IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Aviation Computerized Maintenance System (ACMS).		
5.B.01	<b>TROUBLESHOOT</b> hydraulic system discrepancies to the component/wire level IAW applicable publications.		
5.B.02	<b>TROUBLESHOOT</b> aircraft fuel system discrepancies to the component/wire level IAW applicable publications.		
5.B.03	<b>CALIBRATE</b> fuel quantity indicating system IAW applicable publications.		
5.B.04	<b>RIG</b> and <b>ADJUST</b> power controls, fuel selectors, and shut-off valve linkages IAW applicable publications.		
5.B.05	<b>TROUBLESHOOT</b> aircraft lubrication system discrepancies IAW applicable publications.		
5.B.06	<b>TROUBLESHOOT</b> landing gear system discrepancies to the component/wire level IAW applicable publications.		
5.B.07	TROUBLESHOOT brake system discrepancies to the component/wire level IAW applicable publications.		
5.B.08	<b>TROUBLESHOOT</b> aircraft powerplant discrepancies to the component/wire level IAW applicable publications.		
5.B.09	<b>TROUBLESHOOT</b> Auxiliary Power Unit (APU) system discrepancies to the component/wire level IAW applicable publications.		
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5.B.10	TROUBLESHOOT aircraft pressurization system discrepancies to the component/wire level IAW applicable publications.		
5.B.11	<b>TROUBLESHOOT</b> aircraft air conditioning system discrepancies to the component/wire level IAW applicable publications.		
5.B.12	<b>TROUBLESHOOT</b> starter system discrepancies to the component/wire level IAW applicable publications.		
5.B.13	<b>TROUBLESHOOT</b> ignition control system discrepancies to the component/wire level IAW applicable publications.		
5.B.14	<b>TROUBLESHOOT</b> flight control system discrepancies IAW applicable publications.		
5.B.15	RIG and ADJUST flight controls IAW applicable publications.		
5.B.16	<b>TROUBLESHOOT</b> engine electrical/electronic control systems IAW applicable publications.		
5.B.17	<b>TROUBLESHOOT</b> engine anti-ice/de-ice system discrepancies to the component/wire level IAW applicable publications.		
5.B.18	<b>TROUBLESHOOT</b> windscreen anti-ice/de-ice system discrepancies to the component/wire level IAW applicable publications.		
5.B.19	<b>TROUBLESHOOT</b> fire extinguisher system discrepancies to the component/wire level IAW applicable publications.		
5.B.20	<b>TROUBLESHOOT</b> fire detection system discrepancies to the component/wire level IAW applicable publications.		
5.B.21	<b>REPLACE</b> cartridges and cartridge-activated devices IAW the Use of Cartridge Activating Devices Manual, NAVAIR 11-100-1 (series).		
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5.B.22	TROUBLESHOOT aircraft flotation system discrepancies to the component/wire level IAW applicable publications.		
5.B.23	SERVICE aircraft flotation systems IAW applicable publications.		
5.B.24	<b>TROUBLESHOOT</b> aircraft hoist system discrepancies to the component/wire level IAW applicable publications.		
5.B.25	REPLACE airframe seals IAW applicable publications.		
5.B.26	<b>REPLACE</b> panels in windshields, plastic enclosures, or windows IAW the Maintenance and Repair of Transparent Plastics Manual, T.O.1-1A-12 and applicable publications.		
5.B.27	REPAIR corrosion damaged aircraft structures and electrical components IAW the Aircraft Weapons Cleaning and Corrosion Control Manual, NAVAIR 01-1A-509, the Avionics Cleaning and Corrosion Control Manual, NAVAIR 16-1-540, and applicable publications.		
5.B.28	<b>TROUBLESHOOT</b> aircraft components for excessive vibration IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
6.B.01c	<b>DIRECT</b> line crew operations IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST 13020.1 (series), the Aviation Computerized Maintenance System (ACMS) and local station instructions.		
6.B.01	<b>DIRECT</b> the repair of aircraft systems IAW the Aviation Computerized Maintenance System (ACMS), the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); and applicable aircraft publications.		
6.B.02	<b>CALCULATE</b> and <b>ANALYZE</b> engine performance data IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
6.B.03	SUPERVISE functional checks of aircraft systems IAW the Aviation Computerized Maintenance System (ACMS), the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), and applicable publications.		
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RATING: AVIA	ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
6.B.04	<b>SUPERVISE</b> flight control rigging IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
6.B.05	<b>DIRECT</b> the repair of aircraft structural damage IAW the General Structure Repair Manual, T.O. 1-1A-1 and applicable aircraft Structural Repair Manuals (SRM).		
6.B.06	<b>INSTRUCT</b> personnel in the safe handling of cartridges and cartridge activated devices IAW the Aviation Computerized Maintenance System (ACMS) and applicable publications.		
Major Duty	y: C. General Aviation		
Task:			
7.C.01c	<b>REVIEW</b> the unit aircraft salvage plan IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), the Shipboard-Helicopter Operational Procedures Manual, COMDTINST M3710.2 (series), applicable aircraft manuals and local station instructions.		
7.C.02c	DIRECT Quality Assurance (QA) inspections IAW the Aviation Computerized Maintenance System (ACMS), the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
7.C.03c	PREPARE the following types of local maintenance instructions IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series):		
	<ol> <li>Continuing Action Maintenance Instruction (CAMI)</li> <li>Single Action Maintenance Instruction (SAMI)</li> <li>Technical Information Maintenance Instruction (TIMI)</li> </ol>		
Major Duty	y: D. Shop Maintenance		
Task:			
4.D.01	REPAIR metal structures IAW the General Structure Repair Manual, T.O. 1-1A-1 and applicable aircraft Structural Repair Manuals (SRM).		
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RATING: AVIA	ATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
4.D.02	<b>APPLY</b> aircraft paints IAW the Aircraft Weapons Cleaning and Corrosion Control Manual, NAVAIR 01-1A-509 and applicable publications.		
4.D.03	REPAIR tertiary composite structures IAW the Composite Repair Process Manual, T.O. 1-1-690 and applicable publications.		
4.D.04	<b>INSPECT</b> aircraft components using Non-Destructive Inspection (NDI) methods IAW the NDI Methods Manual, T.O. 33B-1-1 and applicable publications.		
4.D.05	<b>FABRICATE</b> aircraft stainless steel cable assemblies IAW the Aircraft and Missile Structural Hardware Manual, T.O. 1-1A-8 and applicable publications.		
4.D.06	REPLACE packings and gaskets in aircraft systems IAW the Aviation Hydraulic Manual, NAVAIR 01-1A-17 and applicable publications.		
5.D.01c	INSTRUCT personnel in shop safety procedures IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series); the Safety and Environmental Health Manual, COMDTINST M5100.47 (series); and local station instructions.		
5.D.01	INSPECT aircraft components using the Eddy Current Non-Destructive Inspection (NDI) method IAW the NDI Methods Manual, T.O. 33B-1-1 and applicable publications.		
5.D.02	PRESERVE and DE-PRESERVE aircraft equipment IAW the Preserving Naval Aircraft Manual, NAVAIR 15-01-500 and applicable publications.		
5.D.03	<b>BUILD UP</b> aircraft wheel and tire assemblies IAW applicable publications.		
5.D.04	<b>INSPECT</b> engine internal components parts for service and repair limits IAW applicable publications.		
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RATING: AVIATION MAINTENANCE TECHNICIAN (AMT)	INIT	DATE
6.D.01c DIRECT shop maintenance IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
6.D.02c INSTRUCT personnel in the proper disposition of defective aircraft components IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).		
6.D.03c INSPECT work areas, tools and aviation equipment for safety compliance IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and the Safety and Environmental Health Manual, COMDTINST M5100.47 (series).		
6.D.04c COORDINATE calibration and repair of special tools and measuring equipment IAW the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) and local station instructions.		
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TERMINOLOGY		
<b>ANALYZE</b> : To separate into fundamental parts or basic principles so as to determine the nature of the whole.		
<b>APPLICABLE PUBLICATIONS</b> : The appropriate aircraft system, component or general aviation instruction.		
AUDIT: An official examination and verification of publications and directives.		
COMPONENT: An item designed to be removed and replaced on the aircraft.		
CALCULATE: To ascertain by mathematical methods; compute.		
FABRICATE/BUILD-UP: To construct by combining or assembling.		
<b>REVIEW</b> : To examine for the purpose of correcting possible errors.		
SAFETY WIRE: The process of applying lockwire to prevent accidental loosening.		
<b>SERVICE</b> : To provide minor maintenance, i.e. supplying with water, fuel, oil and air.		
SHEARWIRE: The process of applying shearwire to prevent accidental actuation.		
<b>TROUBLESHOOT</b> : The process of diagnosing, locating and repairing faults in equipment by means of systematic checking or analysis.		
END		
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NAME (Last, First, Middle Initial)	SOCIALS	SECURITY NO.



# **Aviation Maintenance Technician First Class**



U.S. Coast Guard Pamphlet No. A10601 (08/98, change 1) Syllabus 6.A.01c

### Performance **REVIEW** discrepancy information from aircraft records and **DETERMINE** the appropriate action that should be taken. References Perform the objectives listed below IAW one or more of the following references: • Air Operations Manual, COMDTINST M3710.1 (series), Chapters 4 and 9 • Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), Chapters 1 and 4 ACMS • Applicable maintenance publications • Local station instructions (as applicable) Performance Given an aircraft discrepancy, **VERIFY** that the appropriate aircraft Objective 1 flight status is assigned.

## Performance Objective 2

Given an aircraft discrepancy, **REVIEW** the discrepancy with the originator (as required) to ensure that it is thoroughly understood.

## Performance Objective 3

Given an aircraft discrepancy, **DETERMINE** the rating responsible for correcting the discrepancy.

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#### Performance Objective 4

Given an aircraft discrepancy and the required technical information, **DETERMINE** the action to correct the discrepancy.

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

**STATE** the name of the manual used to assist Coast Guard personnel in procuring parts, tools, and other materials.

**STATE** the types of information the Federal Logistics (Fed Log) system provides.

**DETERMINE** the amount of identifying information needed to locate an item in the Fed Log system.

**STATE** the manual used to order ground support equipment for your assigned aircraft.

**DEFINE** an open market purchase.

**DEFINE** a micro-purchase.

**STATE** the micro-purchasing guidelines to follow when making an open market purchase.

**STATE** the monetary amount at which an open market purchase must be set aside for a small business.

**STATE** when to solicit at least 3 price quotes when making an open market purchase.

**STATE** the use of the Procurement Request Process Rapidly Form (PR).

**COMPLETE** a procurement request process rapidly form with the required information.

Continued next page

#### 6.A.02c Procuring Parts, Tools, and other Materials (Continued)

#### References

The information contained in this assignment can be found in the following references:

Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

General Services Administration (GSA) Supply Catalog

Federal Logistics (Fed Log) CD-ROM

Illustrated Parts Breakdown Manual, CGTO 1C-130-4

Illustrated Tool and Equipment Manual, A1-H60CA-GSE-400

Illustrated Tool and Equipment Manual, CGTO 32H-65A-2

Ground Support and Related Equipment Manual, CGTO 32A-25A-2

Simplified Acquisition Procedures Handbook, COMDTINST M4200.13 (series)

Supply Policy and Procedures Manual, COMDTINST M4400.19 (series)

Federal Accusation Regulation (FAR) 19.102

Overview 6.A.02c

#### Introduction

This assignment is an introduction to the Federal Logistics (Fed Log) system, the General Services Administration (GSA) Catalog and the Ground Support Equipment (GSE) section of your aircraft technical manuals. In this assignment you will also go through the process of submitting a request for the open market purchase of parts, tools, and other materials.

As a first class petty officer and aircraft technician, you will use and rely upon these publications. Knowing how to use these publications is important for you to perform your duties. For procuring parts, tools, and other materials, refer to the Simplified Acquisition Procedures Handbook, COMDTINST M4200.13 (series).

Each Coast Guard unit must maintain an accountable, accurate open market purchase policy that conforms to the Federal Acquisition Regulations (FAR). Keeping these purchases accurate is important in account record keeping and property management.

Continued next page

#### In This Assignment

This assignment contains the following:

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All government procurement actions, regardless of dollar value, shall use the following sources of supply.

#### **Supplies**

The following sources are available for procurement of goods for the Coast Guard:

Agency Inventory

Excess From Others Agencies (e.g., Defense Reutilization and Marketing Office, DRMO)

Federal Prison Industries, Inc. (UNICOR)

Products available from the Committee for purchase from:

- People Who Are Blind or Severely Disabled
- National Industries for the Blind
- National Industries for the Severely Handicapped (NIB-NISH)
- Javits-Wagner-O'Day Act (JWOD)

Wholesale supply sources such as:

- GSA stock program
- Defense Logistics Agency (DLA)
- Department of Veterans Affairs (VA)
- Military inventory control points

Mandatory Federal Supply Schedules

Open-Market Commercial Suppliers (including educational and nonprofit institutions)

#### **Services**

The following sources are available for the procurement of services for the Coast Guard:

Committee for Purchase from People Who Are Blind or Severely Disabled (NIB-NISH)

Mandatory Federal Supply Schedules

Federal Prison Industries, Inc. (UNICOR)

Open Market Commercial Sources (including educational and nonprofit institutions)

#### 6.A.02c General Services Administration (GSA) Supply Catalog

#### Introduction

The General Services Administration (GSA) is a government agency that buys commonly used supplies and services for all other government agencies. The GSA's office of Federal Supply Service (FSS) is the primary source of personal property, non-personal services, and numerous common-use materials and supplies. These materials and supplies are listed in the GSA Supply Catalog.

#### **Description**

The GSA Supply Catalog lists over 24,000 products with descriptions and pictures. It also contains requisitioning instructions and product return instructions.

#### GSA Supply Catalog Sections

The GSA Catalog is divided into the following sections:

Alphabetical Index

NSN Index

Specification Index

Introduction

Office/Shop Products

**Tools** 

**Industrial Products** 

**Furniture** 

Each of the last four sections are divided into categories and subcategorizes that group products more specifically. A Divider Index at the beginning of each section lists the categories and subcategorizes in that section.

#### Mandatory Source

The GSA Supply Catalog is a mandatory source of supply only if it meets your specific needs. If an item is not available from higher-priority sources and is listed in the GSA Supply Catalog, it must be ordered from this catalog.

#### Exception to Mandatory Source

To determine if an exception is applicable, refer to the Simplified Acquisition Procedures Handbook, COMDTINST M4200.13 (series).

If a product is not located in the catalog, call GSA to inquire about the product. Prices are constantly changing with the times, so the actual prices listed in the catalog may be different from those shown.

Practice Exercise (GSA Supply Catalog)

You need to order some glass cleaner for your shop so you get a copy of the GSA Catalog to research the required information.

Procedure for Using the GSA Catalog

The following table details what you would do to find a particular product in the GSA Catalog:

STEP	ACTION
1	Turn to the Table of Contents and find the Alphabetical Index
2	Locate glass cleaner, look for page number
3	Turn to page and find picture, verbal description, sizes available, NSN, and prices
4	Enter all information on the Surf Requisition Log or unit equivalent
5	Submit paperwork to supply
6	Ensure copy of form is filed in your shop's budget file for future reference

The requisition form used by Coast Guard units to requisition parts, tools, and other materials, will either be form CG-4940, or your unit's equivalent. Once the part number, NSN, quantity, and unit cost are known, the next step is to place a requisition for the part.

#### Definition of a CG-4940 Surf Requisition Form

The CG-4940 surf requisition form is a multi-purpose form and must be used by unit personnel to advise the storekeeper of the unit's material requirements.

## Example of a Surf Requisition Form

This is an example of a CG-4940 Surf Requisition Form.

U.S. DEP TRANSP CG-4940	ARTMEI ORTATIO	REQUISITION LOG											UNIT OPFAC NUMBER SHEET NUMBER (2)
DEPT (3)	COG (4)	STOCK NUMBER (5)	U/I (6)	QUANTITY (7)	UNIT COST (8)	DOCUMENT NUMBER DATE SERIAL (9) (10)	FUND CODE (11)	OBLIGATION AMOUNT (12)		DATE RECEIVED (13)	ACTUAL COST (14)		NOMENCLATURE AND SUPPLIER (15)
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## Guidelines for Completing the Form

Use the following guidelines for completing the Surf Requisition form:

Complete columns (3) through (8), and (15).

Ensure that supply, shipment status, and receipt of materiel ordered are recorded on the form to complete the transaction.

Use the requisition log as the undelivered order file so that the form can be used as a funding-approval document or for other purposes as locally determined.

Items available from the Defense Logistics Agency (DLA) are listed in the Federal Logistics Computer Disk (CD) System (Fed Log) on CD-ROM.

#### Description of Fed Log Computer Disk (CD-ROM) System

The Federal Logistics Computer Disk (CD) System is a multi-disk set, containing federal logistics information on one disk and Army-unique, Navy-unique, and Air Force-unique data on their own disks. The Fed Log system is currently used by all Coast Guard aviation units.

#### **Listed Items**

Fed Log provides logistics information, including the following:

CAGE codes (Commercial and Government Entity code)

National stock numbers

Reference number data

Item/colloquial name index

Part numbers

Suppliers

Interchangeability and substitutability information

Freight, and product characteristics

#### Guidelines for Accessing the Fed Log System

How to use the computer system at your unit to access the Fed Log system is not covered in this assignment. You will need to have someone at your unit show you the procedure.

The Fed Log system is the same thing as the General Services Administration Catalog, except it is available on the CD ROM system.

#### Guidelines for Using the Fed Log System

Once logged into the Fed Log System, follow the screen prompts and enter at least one piece of identifying information about the item you are looking for, such as:

Name/Nomenclature

Part number

National stock number

Regardless of which piece of information you enter, additional information will be displayed on the screen.

#### **Practice Exercise**

After using the last box of shop towels to clean up an oil spill, you need to order four more boxes.

## Procedure for Finding Products

The following table details what you would do to find a particular product in the Fed Log system:

Step	Action
1	Get the part number off of the empty box
2	Enter the part number into the Fed Log System
3	Select the view for the information you require
4	Enter all information on the Surf Requisition Log or unit equivalent
5	Submit paperwork to supply
6	Ensure a copy of the form is filed in your shop's budget file for future reference

#### **Description**

Special tools and support equipment, are special tools, equipment, or test equipment designed for use on a specific aircraft. Each airframe has an illustrated parts breakdown of all special tools and ground support equipment associated with that aircraft.

## Manuals and Stocking Lists

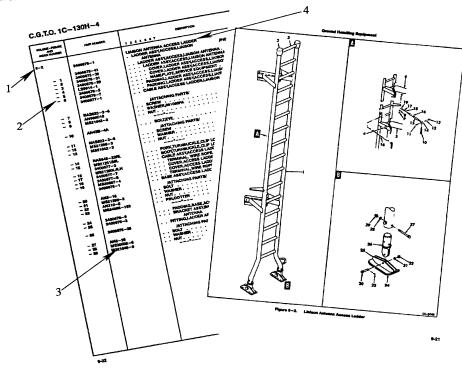
The following reference manuals and stocking lists are used to research information used to order aircraft-special tools and support equipment (i.e. engine slings) that are only applicable to that airframe. The manuals and stocking lists are as follows:

Aircraft Type	Type of Information/References
НН-60Ј	Illustrated Parts Breakdown
	Special Support Equipment A1-H60CA-GSE-400
HC-130	Illustrated Parts Breakdown
	Aerospace Ground Equipment Section 1C-130H-4
HU-25	Illustrated Tool and Equipment Manual 32A-25A-2
НН-65А	Illustrated Tool and Equipment Manual 32H-65A-2
All Aircraft	Stocking List for all Aircraft Materiel
	Listed according to unit's needs and what is in stock at that unit Aircraft Materiel Stocking List, CG 298

#### Ordering

After finding the part number for the item, enter it into the Fed Log system to access the required information to enter on the Surf Requisition Log. Complete the log and submit it to the unit storekeeper for processing. Ensure that you keep a copy for your shop files.

Illustration of a Support Equipment Manual Below is an example of a support equipment manual showing a Liaison Antenna Access Ladder and it's parts breakdown as listed in the Aerospace Ground Equipment section of the Illustrated Parts Breakdown, 1C-130H-4.



## Description of Reference Numbers

Below are descriptions of references found in the Illustrated Parts Breakdown, 1C-130H-4.

Reference Number	Description
1	Figure number identifies the corresponding illustration.
2	Index numbers are assigned to individual parts that make up the assembly and correspond to the illustration numbers.
3	Part number, this is the part identification number assigned by the manufacturer.
4	Each part is described to make identification easier.

#### Definition

An open market purchase is a purchase from commercial sources when all government supply sources have been evaluated and are not available or cannot satisfy the government's needs.

## Micro-Purchase Policy

An open market purchase of supplies/services for \$2,500.00 or less is known as a micro-purchase. The procurement methods for making a micro-purchase are detailed in the Simplified Acquisition Procedures Handbook, COMDTINST M4200.13 (series). These methods are designed to do the following:

Reduce administrative work and expedite the purchases of readily available supplies/services.

Simplify the process once the procurement official determines that the item/service is not available from a mandatory source.

#### NOTE

Micro-purchasing does not waive mandatory supply sources or procedures.

### Micro-Purchasing Guidelines

The following guidelines should be followed when making a micropurchase:

Purchases do not have to be reserved for small businesses

Purchases shall be rotated among qualified suppliers

Purchases may be made without competitive quotes

Ensure the price is fair and reasonable

Personal preference and brand-name identification shall not limit vendors

Federal Acquisition Regulation clauses are not required for micropurchases

#### **Open Market Purchases From Small Businesses**

#### Small Business Set-Aside Policy

All open market purchases between \$2,500.01 and \$100,000.00 are to be set aside for small business.

## Small Business Requirements

As stated in the Federal Acquisition Regulation (FAR) 19.102, the Small Business Administration establishes small business size standards on an industry-by-industry basis. Size standards are based on either a firms average number of employees during pay periods for the preceding twelve months or its average annual gross receipts for the past fiscal years.

#### Procedure for Identifying a Small Business

What is required of you, the requisitioner? Refer to the Simplified Acquisition Procedures Handbook M4200.13 (series) for information on open market purchases or refer to the steps in the following table:

Step	Action								
1	the business or service you l business or not.	ou are dealing with if they ar	re a						
	IF	THEN							
	they are,	do business with them.							
	they are not,	find another source.							

#### **NOTE**

When you turn in your Procurement Request Form, you will be informing the purchasing authority that you are dealing with a small business.

As a supervisor, you will be required to submit open market purchase requests for acquiring shop and aeronautical equipment, i.e. aircraft test equipment, cabinets, chairs, etc... Certain information is required from you, the requisitioner, to make the acquisition process run smoothly with minimum delays.

## Open Market Purchases and Procedures

Most open market purchases are considered Small Purchases. The steps listed below should be followed when submitting an open market purchase request.

Step	Action									
1	Locate sources and check suppliers for small business, labor surplus, and the buy - American program									
2	Solicit price quotes (if required)									
	If the cost is Then									
	\$2,500.00 or less a one price quote is sufficient if price is considered to be fair and reasonable									
	more than \$2,500.01 up to \$100,000.00 you must solicit at least 3 competitive price quotes unless the vendor is a sole source									
	more than \$2,500.01 and the vendor is the sole source document with a Sole Source Justification. Refer to COMDTINST M4200.13 (series)									
3	Evaluate solicited quotes to determine source of supply									
4	Complete a purchase request and submit to storekeeper									
5	Keep a copy of purchase request in shop files									

#### NOTE

The purchase authority will be reviewing your procurement request and if the authority has any questions, it will be returned to you. A returned request will slow down the process. 6.A.02c Blank Page

After settling on a final quote for a product or service, you will have to fill out a *Department of Transportation* (D.O.T.) Procurement Request Process Rapidly Form, Form DOT F 4200.1.2CG (PR). This form is used to make an open market purchase and is submitted to your unit purchasing authority.

Illustration of the Procurement Request Progress Rapidly

This is an example of a D.O.T. *Procurement Request Process Rapidly* Form, Form DOT F 4200.1.2CG (PR). The following two pages show how the form should be completed.

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#### 6.A.02c Procurement Request Process Rapidly Form (Continued)

#### Description/ Function of Sections

The reference table below gives an explanation of each section of the form that is required to be filled out. The rest of the form will be filled out by the supply department. The Procurement Request Process Rapidly Form (PR) is on the following page:

Block No.	Description	Function	Remarks
1	Name & Phone Number	Your name, title and extension	Typed or Printed
2	Type of Request A. New Request B. Change to C. Modification to	Check whether PR will be a new one, continuation, or modifying existing order	Typed or Printed
3	Originating Office Data	Your shop/office, work area	Typed or Printed
4	Additional Information	Name, address, phone number and fax number of the company or service you are doing business with	Typed or Printed
5	Approvals A. C. B. D. Routing	Name and Title of Approving Official(s)	Typed or Printed
6	Consignee & Destination	Where the merchandise is sent to, or services performed at	Typed or Printed
7	Date Required/PR Priority	An agreed upon delivery date or date item needed by, between the supplier and the requisitioner	PR/Priority
8	Self-explanatory	Self-explanatory	Self-explanatory
9	Description of Items or Service	Enter the description, quantity, unit and estimated cost	Include the cost of shipping in the amount column
10	Accounting Data	Indicates the quarter of the fiscal year the funds are coming out of and the total amount of the order	1 <sup>st</sup> , 2 <sup>nd</sup> , etc

Continued next page

Description/ Function of Sections (Continued) Blocks located below block # 10, is information that must be completed by the store keeper at your unit. It is accounting data that is for unit level information concerning supply.

Example of Completed PR Form

A typical Procurement Request Process Rapidly Form (PR) is completed as shown below.

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#### Introduction

You will complete a Procurement Request Form with the information provided in the practice scenario below.

#### **Directions**

Read the scenario below and complete the PR on the next page, or a blank form provided at your unit with the required information.

#### Scenario

As the Aviation Maintenance Supply Petty Officer for your unit, you are taking an inventory of electrical equipment and determine that you need to order three multimeters and two megohmmeters to bring your inventory back up to complement.

You have just entered the fourth quarter of the fiscal year.

You found a company that supplies what you are looking for, and is classified as a small business, (Network Electronics, 5415 Mariner St. Largo, Florida, 33541, Phone # (813) 555-1111, Fax # (813) 555-1112.

Shipping charge, \$24.00.

Visa credit card is accepted.

Shipping time is 14 days.

Item #1: Megohmmeter, battery powered, digital, model # AMB-4D, stock # 50F4911, price \$279.85 each.

Item #2: Multimeter high performance, model #79, stock #50F6944, price \$185.00 each.

You are to use your unit's address, work area and extension to complete the Procurement Request Form.

Procurement Request Process Rapidly Form Complete the form below using the information provided on page 20. If you have questions filling out the form, review the feedback on the next page.

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# **Feedback**

Your Purchase Request form should be completed as shown below. If you had trouble completing this form, review the applicable section of this reading assignment and correct any errors found.

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#### **Directions**

In this practice exercise you will be using either the GSA Catalog or the GSA CD-ROM on the Fed Log System. Read each scenario below carefully and research the required information. After you have completed the practice exercise, compare your information with the feedback on the next page.

# Materials Required

The following materials are required to complete scenario's #1 and #2.

**GSA** Catalog

GSA CD-ROM for the Fed Log System

#### Scenario #1

You are assigned to the AMT shop, and your Chief assigns you the task of ordering two new non-sparking 5.5" to 6.6" long, three - quarter inch jaw capacity adjustable wrenches for the oxygen carts. Using either the GSA catalog or the Fed Log system, research the wrenches and fill out the Surf Requisition (CG 4940) or local equivalent.

#### Scenario # 2

You are assigned to the Quality Assurance Office. Your Chief informs you that the office is running low on medium size paper clips and assigns you the task of ordering ten boxes. Using either the GSA catalog or the Fed Log system, research the medium size paper clips and fill out the Surf Requisition Log (CG 4940) or local equivalent.

# **Procuring GSA Equipment, Feedback**

## Feedback

Compare your information with the feedback below. The prices may be different due to the time of publication of this text, and price adjustments. If you had trouble finding the information, review the appropriate section of this lesson or have someone at your unit show you how to access the information.

## Scenario #1

Adjustable Wrench, non -sparking

Stock Number (5120-00-278-0340)

Price (\$22.97)

Unit of Issue (EA)

Source of Supply (GSA)

#### Scenario # 2

Paper Clip, medium

Stock number (7510-00-161-4291)

Price (\$0.57)

Unit of Issue (BX)

Source of Supply (GSA)

#### Introduction

The following practice scenarios are universal in that they can be used on any of the four main airframes currently in the Coast Guard inventory. You will be required only to complete the scenario which pertains to the aircraft that you are assigned at your unit.

# Materials Required

You will need the aircraft Ground Support Equipment Manual for unit assigned aircraft to complete the scenarios below:

## **Directions**

Research the information you would need to provide to your unit's supply department to order the part (part number, stock number, unit cost, source of supply, unit of issue and quantity).

#### Scenario #1

You are assigned to Line Maintenance at your unit. Your Chief just surveyed an aircraft tow bar and assigns you the task of ordering a replacement. Research the required information in the applicable GSE manual and fill out a procurement request or unit equivalent.

#### Scenario # 2

You are assigned to the engine shop. Your Chief assigns you the task of ordering a new engine sling. Research the required information in the applicable GSE manual and fill out a procurement request or unit equivalent.

# **Procuring Ground Support Equipment, Feedback**

# Feedback Scenario #1

Compare your information to the feedback below. If you had any trouble finding the information, review the Procuring Ground Support Equipment section in this lesson or have someone show you how to access the information.

Towbar	HC-130	HU-25
Part Number	403980-1	TMY2-09.105
Stock Number	1730-00-554-5439	Supplied by ARSC
Unit Cost	\$3,630.00	Supplied by ARSC
Source of Supply	N32	ARSC
Unit of Issue	EA	EA
Quantity	01	01

Towbar	НН-60	НН-65
Part Number	1479AS400-1	703A91-0415-00
Stock Number	1730-01-154-1784	Supplied by ARSC
Unit Cost	\$7,200.00	Supplied by ARSC
Source of Supply	N32	ARSC
Unit of Issue	EA	EA
Quantity	01	01

# Procuring Ground Support Equipment, Feedback (Continued) 6.A.02c

Feedback Scenario # 2 (Continued) Compare your information to the feedback below. If you had any trouble finding the information, review the Procuring Ground Support Equipment section in this lesson or have someone show you how to access the information.

Engine Sling	HC-130	HU-25
Part Number	404055-1	TMY20-71.102G01
Stock Number	1730-00-670-1556	Supplied by ARSC
Unit Cost	\$7,750.00	Supplied by ARSC
Source of Supply	N32	ARSC
Unit of Issue	EA	EA
Quantity	01	01

Engine Sling	НН-60	НН-65
Part Number	70700-77408-047	LTCT-5454-01
Stock Number	1730-01-274-3556	Supplied by ARSC
Unit Cost	\$286.00	Supplied by ARSC
Source of Supply	N32	ARSC
Unit of Issue	EA	EA
Quantity	01	01

6.A.02c Blank Page

# Questions

Answer the following questions on procuring parts, tools and other materials

What types of infor	rmation does the Fed Log system provide
• •	2)2)
	4)
	6)
	8)
When logged on the	Fed Log system, follow theand enter at
When logged on the	Fed Log system, follow the
When logged on the  What manuals are us order ground suppor	Fed Log system, follow the and enter atabout the ite sed to research the information required t equipment, for your specific aircraft?
When logged on the  What manuals are us order ground support one answer required	Fed Log system, follow the and enter atabout the ite sed to research the information required t equipment, for your specific aircraft?
When logged on the What manuals are us order ground support one answer required;  1) HH-60J	Fed Log system, follow the and enter atabout the ite sed to research the information required t equipment, for your specific aircraft?
When logged on the What manuals are us order ground support one answer required;  1) HH-60J	Fed Log system, follow the and enter atabout the ite sed to research the information required t equipment, for your specific aircraft?

# Procuring Parts, Tools, and other Materials, Self-Quiz (Continued)

Questions (Continued)	5.	What is an open market purchase?
	6.	An open market purchase of supplies/services for \$2,500.00 or less is known as a
	7.	State the guidelines to follow when making a micro-purchase.  1
	8.	All open market purchases between \$ and \$ are set aside for small businesses.

# Procuring Parts, Tools, and other Materials, Self-Quiz (Continued)

6.A.02c

Questions
(Continued)

	\$
10	. You will have to fill out a Procurement Request Process Rap
Fo	rm (PR) after settling on a
11	. The Procurement Request Process Rapidly Form (PR) is used
ma	ake an

# Procuring Parts, Tools, and other Materials Self-Quiz, Feedback

# **Feedback**

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1	The Simplified Acquisition Procedures Handbook, COMDTINST M4200.13 (series)	3
2.	<ol> <li>CAGE codes</li> <li>National stock numbers</li> <li>Reference number data</li> <li>Item/colloquial name index</li> <li>part numbers</li> <li>suppliers</li> <li>interchangeability and substitutability information</li> <li>freight</li> <li>product characteristics</li> </ol>	9
3.	<ol> <li>screen prompts</li> <li>one piece of identifying information</li> </ol>	10
4.	A1-H60CA-GSE-400 1C-130H-4 32A-25A-2 32H-65A-2	11
5.	A purchase from commercial sources when all government supply sources have been evaluated and are not available or cannot satisfy the government's needs.	13
6.	micro-purchase	13

Self-Quiz Feedback (Continued) Compare your answers to the feedback provided below.

Question	Answer	Reference
7.	1) Purchases do not have to be reserved for small businesses	13
	2) Purchases shall be rotated among qualified suppliers	
	3) Purchases may be made without competitive quotes	
	4) The price is fair and reasonable	
	5) Personal preference and brand-name identification shall not limit vendors	
	6) Federal Acquisition Regulation clauses are not required for micro-purchases	
8.	\$2,500.01 and \$100,000.00	15
9.	\$2,500.01	15
10.	final quote for a product or service	17
11.	open market purchase	17

6.A.02c Blank Page

**Syllabus** 6.A.02c Performance PROCURE parts, tools and other materials. References Perform objectives listed below IAW one or more of the following references: COMDTINST M13020.1 (series) COMDTINST M4400.19 (series) COMDTINST M4200.13 (series) CGTO 1C-130-4 A1-H60CA-GSE-400 CGTO 32H-65A-2 CGTO 32A-25A-2 Federal Logistics (Fed Log) CD-ROM General Services Administration (GSA) Supply Catalog Local Instructions (as applicable) Performance Given access to the Fed Log System and at least one piece of identifying information for an item, OBTAIN all the required **Objective 1** information to order the item. **Performance** Given access to a GSA Catalog and the name of an item, **OBTAIN** all **Objective 2** the required information to order the item.

Performance
Objective 3

Given the name of an aircraft special tool, the applicable Ground Support Equipment Manual, a CG 298, and access to the Fed Log System, **OBTAIN** all the required information to order the special tool.

# Performance Objective 4

Given all the information required to order parts, tools, and other materials, **COMPLETE** the appropriate form, either a surf requisition form/local equivalent or a procurement request process rapidly form.

**Performance** PREPARE shop and aircrew training schedules. References Perform the objectives listed below IAW one or more of the following references: • Air Operations Manual, COMDTINST M3710.1 (series), Chapters 1, 8, 9, and Appendix A • Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), Chapter 6 • Aviation Maintenance Management Information System (AMMIS) • Local station instructions (as applicable) Performance **DETERMINE** shop training required. **Objective 1** Performance **DETERMINE** the personnel available for conducting shop training. **Objective 2** Performance **PREPARE** a shop training schedule. Objective 3 Performance **COORDINATE** aircrew training with the Training Petty Officer to **Objective 4** meet station requirements.

6.A.03c

**Syllabus** 

6.A.03c Blank Page

**Syllabus** 6.D.04c Performance COORDINATE calibration and repair of special tools and measuring equipment. References Perform the objectives listed below IAW one or more of the following references: • Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), Chapter 9 • TMDE Calibration Notes, Maintenance Data Collection Codes, AFTO 33K-1-100-1 • Local station instructions (as applicable) Performance **IDENTIFY** special tools or measuring equipment-requiring Objective 1 calibration. Performance **DETERMINE** the source for calibration of special tools or **Objective 2** measuring equipment. Performance **STATE** the routing procedures at your unit for special tools and **Objective 3** measuring equipment requiring calibration. Performance **STATE** the procedures at your unit for scheduling, and tracking the **Objective 4** status of special tools and measuring equipment requiring calibration.

6.D.04c Blank Page

## **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the manual used for additional information on the Aviation Computerized Maintenance System (ACMS).
- **STATE** the 3 common types of maintenance reports.
- **STATE** the disposition of Significant Component History Report's (SCHR's) for uninstalled serial numbered items.
- **STATE** the minimum printing requirements for the Maintenance Due List (MDL).

## References

The information contained in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- ACMS User's Guide, CGTO PG-85-00-10

# In This Assignment

This assignment contains the following:

Subject	Page
ACMS Component Reports	3
ACMS Configuration Report	4
ACMS Significant Component History Report	6
ACMS Maintenance Due List Report	8
ACMS Report Data Self-Quiz	10
ACMS Report Data Self-Quiz, Feedback	12
Syllabus	13

## Introduction

All Coast Guard aircraft have specific components or equipment that are tracked or monitored by flight hours, landings or cycles including the actual airframe itself. This information is complied and printed in several different computer report formats. The reports can be used to form trend analysis and to identify problem areas.

## Reports

Common reports that are frequently generated by the ACMS user are the reports that you as a technician at a unit will most likely come in contact with from day to day. For additional information about types of reports and information contained in the ACMS, refer to CGTO PG-85-00-10. Listed below are some of the common reports generated:

- Configuration Report
- Maintenance Due List
- Significant Component History Report (SCHR)

# Configuration Report

The Configuration Report presents a detailed itemized listing of an aircraft or selected assembly that is tracked by serial number. The configuration report primarily lists all sub-components of a major assembly tracked by serial number. Informational details of the report include:

- Part Name
- Part Pos (Part Position)
- CEI Number (Component End Item; used by ACMS contractor)
- Serial Number
- Part Number
- TSN (Time Since New)
- TSO (Time Since Overhaul)

#### **NOTE**

The absence of a serial number entry against a particular component indicates that the component is not installed in the database and required maintenance is not being scheduled for it.

# Configuration Report Example

The report shown below is an example of a typical ACMS Configuration Report; this one is for the HH-60J:

			E					ָהָל עָרָ הַיּרָ		c
		CG / HH-6U AIRCKAF	ALECEART ON REPORT					DATE:	07/13/98	86
***************************************	* * * *	******	******	******	********	****	******	******	*****	* * * *
		(GENERAL I	(GENERAL INFORMATION)	No	C					
OPERATING ACTIVITY	Ņ.	ASSEMBLY NUMBER	,	TSN HRS	HRS					
AR 6. SC	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	6027	(T) ** ** ** ** ** **	3381	10	****	****	*****	****	* * * *
	( ( (									
PART NAME	PART	CEI NUMBER SERI	SERIAL NUMBER	PART N	PART NUMBER	TSN	TSO HOURS LCF1	1 LCF2	TTI	EOH
TODWAD SERVO RELLCRANK	-	60-6700-008 135500587	10587	70400-08101-046	01-046	3381				
AFT SERVO BELCRANK			311	70400-08102-045	12-045	1243				
AFT SERVO WALKING BEAM		60-6700-010 C34600527	0527	70400-08104-048	04-048	7212				
			00187	70400-08112-046	12-046	3381				
LEFT TIEROD	,		A34400685	77400-08115-046	15-046	2001	7891			
PRIMARY SERVO	AF.	60-6730-001 B3030	B30306869B B30306509	2/4000-1033 70410-22820-043	5.5 20-043	2551	2551			
PRIMARY SERVO	3 A		B30305275A	70410-22820-043	20-043	1722	1722			
FOLL TRIM ASSEMBLY	i		00037	70410-22760-050	60-050	10	10			
SAS ACTUATOR			18792	70410-02500-049	00-049	10				
PITCH TRIM ASSEMBLY			12271	70410-22760-051	60-051	640	640			
SAS ACTUATOR			B11207278	70410-02500-049	00-049	2996				
COLL/YAW SERVO ASSEMBLY	00		00861	70410-22910-045	10-045	2999	2999			
SAS ACTUATOR			B40400216	70410-02500-049	00-049	338T	7107			
COLL/YAW SERVO ASSEMBLY	ΧM		A22000735	70410-22910-045	10-045	2/04	7.04			
SAS ACTUATOR		60-6730-005 D2330	BIIZU4519 D23300770	70400-26100-042	00-043	1559	1559			
TAIL ROTOR SERVO			B39902648	2227000-12	2	2319	2319			
BOMB RACK	ΓI	60-8500-001 RFW0228	228	549AS400-1	1	1801	10			
BOMB RACK	ro	_	224	549AS400-1	п.	1410	1410			
BOMB RACK	RI		39	549AS400-1	1.000	755	755			
TAIL ROTOR BLADE	IB	٠,	423801336 103601130	/UIUI-31000-046	00-046	1700	1790			
TAIL ROTOR BLADE	9 G	60-6410-003 A2380	A23001120	70150-29100-040	00-040	3337	2000			
MAIN ROTOR BLADE ASSEMBLY	TO	-	A23701036 A49525522	70150-09107-056	0.0 041	10	)			
MAIN ROLOR BLADE ILF CAF	00		A23701875	70150-29100-041	00-041	2978	2978			
MAIN ROTOR BLADE ASSEMBLE MAIN ROTOR BLADE TIP CAP	9		A49518539	70150-09107-056	07-056	501				
MAIN ROTOR BLADE ASSEMBLY	03		A23701853	70150-29100-041	00-041	3372	3372			
MAIN ROTOR BLADE TIP CAP			A49522813	70150-09107-056	07-056	711				
MAIN ROTOR BLADE ASSEMBLY	04		A23701694	70150-29100-041	00-041	3222	3222			
MAIN ROTOR BLADE TIP CAP		60-6210-006 A49526183	26183	70150-09107-056	07-056	10				
71 rows										

ND-OF-REPORT

INDICATES A COMPONENT WITH A QUESTIONABLE PART NUMBER. THE PART NUMBER OF THIS COMPONENT SHOULD BE VERIFIED AT THE NEXT SCHEDULED MAINTENANCE OF THIS PART. CONTACT THE ACMS CONTRACTOR TO UPDATE THIS COMPONENT'S PART NUMBER. INDICATES THE COMPONENT IS CURRENTLY IN THE COMPONENT MONITORING PROGRAM.

# **ACMS Significant Component History Report**

# Significant Component History Report (SCHR) Description

This computer-generated report provides a record of significant maintenance actions on serial number tracked items. SCHR's are required to be maintained on all components listed on the Aircraft Configuration Report.

### **SCHR Entries**

Entries to the SCHR that are associated with the processing of a completed Maintenance Procedure Card (MPC) are automatic and include:

- TSN (Time Since New)
- TSO (Time Since Overhaul)
- CSN (Cycles Since New)

Information for the following maintenance actions:

- Installations
- Removals
- Overhauls
- Special Inspections (i.e. overtorque, overspeed, hard landing, etc.)
- TCTO accomplishment

# Other Requirements

Other required entries must be separately entered into the database using appropriate ACMS forms [refer CGTO PG-85-00-10]. All uninstalled serial number tracked components must be accompanied by its SCHR. Major assemblies, classified as Type I (such as engines, rotor heads etc.) which have other serial number tracked components attached must be accompanied by a current Configuration Report as well as all the applicable SCHR's.

#### **CAUTION**

Do not install components tracked by serial number without a SCHR.

# **SCHR Example**

The report shown below is an example of a typical ACMS Significant Component History Report; this one is for the HU-25 general information summary:

				-	111101	man	/11	Su1		ai y	•													
PAGE: 3 DATE: 07/13/98	*********************		SERIAL NUMBER: 2110 ACCEPTANCE DATE: 04/30/82 MANUFACTURER: FALCON JET CORP	******************	TSO OPERATING ACTIVITY	2889 AR & SC 2014 AD 5. SC	S (III	2931 AR & SC	2950 AR & SC 3251 OPERATIONS CENTER	AR & SC	3038 AR & SC	3074 AR & SC	3090 AR & SC	3174 AR & SC	ž (d	3234 AR & SC	AR &		AR &	પ્ય પ	3382 AR & SC		3385 AR & SC	
	**********		SERIAL NUMBER: 2110 ACCEPTANCE DATE: 04 MANUFACTURER: FALCO	******	TSN	2889 2017	F T C 7	2931	2948	3038	3038	3074	3090	3174	r 0 7	3234	3282	3284	3325	3331	3382		3385	
SIGNIFICANT COMPONENT HISTORY REPORT (REPLACES AFTO FORM 95)	***************************************	**************************************	COMPONENT NAME: HU25 AIRFRAME PART NUMBER: HU-25A CEI NUMBER: 25-5300-001	***************************************	TE ACTION APPLIED TO COMPONENT	QUANTECH 9500 FIBER OPTIC CABLE COMPLIED WITH TCTO 425925002, MODIFICATION OF AGIFLITE CAMERA	č			COMPLIED WITH	COMPLIED WITH TCTO H25-930020; PITOT-STATIC PROBE HEAT AND MONITER BOX MONIFICATION			н:	COMPLIED WITH TOTO AZSSZIOU, KELOCATE OZ BOTILE / CABIN FIKE EXTINGUISHER	COMPLIED WITH TCTO H25954080; ENGINE COWLING HINGE LOCK MODIFICATION	INSTRUCT WING TO FORMACE IN CGTCTO H25-926020.0 FIR	INSPECTION. REPLACED VALVE COMPLIED WITH TCTO 93007.0. INSPECTION OF STALL VANE HEAT RELAY	HU25 TCTO 932020	INSPECTED MAIN WHEEL BEARINGS IAW TCTO 932030.0 FOUND 3 FAG BEARINGS	H-25 927020.0 INSPEC	THOUSEOUT T#	H25-923160, MODIFICATION OF AN/ARC-513 VHF-FM DES CIRCUIT CARD COMPLIED WITH THIS DATE.	
	****			*****	ACTION DATE	01/04/95	03/00/33	05/02/95	08/10/95	02/23/33 02/29/96	02/29/96	96/60/50	06/18/96	01/16/97	/6/60/60	05/05/97	09/15/97	09/18/97	12/11/97	01/05/98	04/20/98		05/19/98	

191 rows

# Maintenance Due List Report (MDL)

This computer generated report shows the projected scheduled maintenance of calendar and hourly tasks for a 2-month operating period. The report is printed monthly at a minimum, for each aircraft assigned to the unit.

## **MDL** Information

The information presented on the MDL is basic and self-explanatory using common ACMS abbreviations.

## **MDL Uses**

The MDL is used in preparing aircraft for deployments, scheduling work loads, planning for major inspections, establishing aircraft lineups (what aircraft to fly first), and determining aircraft availability.

# Maintenance Due List (MDL) Example

The report shown below is an example of an MDL; this one is an hourly MDL for the HH-65:

107/13/98		CALENDAR DUE DATE	† † † †																					
PAGE: DATE: 07/	x x x x x x x	**************************************	6185	6185	6185	6185	6185	6185	6185	6185	6185	6185	6185	6185	6192	6192	6192	6192	6192	6207	6207	6207	6209	6203
PAG DAG	K K K K K	******* DO NOT A EXCEED H	6200	6200	6200	6200	6200	6200	6200	6200	6200	6200	6200	6200	6207	6207	6207	6207	6207	6222	6222	6222	6216	6216
) ) ) )	* * * * * * * * * * * * * * *	DUE	6185	6185	6185	6185	6185	6185	6185	6185	6185	6185	6185	6185	6192	6192	6192	6192	6192	6207	6207	6207	6209	6209
7 1 1 1	k k k k	EVERY MOS	! ! ! !																					
+ + + + +	K K K K K	********* REQ'D EVERY HRS MOS	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	75	75
ISI	* * * * * *	***** EST MHR	1.0	2.0	2.0	2.0	0.9	3.0	2.5	3.0	3.0	2.5	2.5	3.5	0.9	3.0	2.5	3.0	3.5	3.0	2.0	2.0	2.5	2.5
AIRCRAFT ICE DUE L	ock)	***** MECH TYPE	AE	AD	AM	AD	AD	AD	AD	AD	AD	AE	AE	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
A AI	. ON BL	POS	 !				01	0.1	01	0.1	01			01	02	02	02	02	02	02	0.1	02		01
CG / HH-65A AIRCRAFT ACMS/AVIONICS MAINTENANCE DUE LIST HOURS HOURS	**************************************	**************************************	6544	6544	6544	6544	W85B021	SC46975	W84G020	W85B021	W85B021	6544	6544	W85B021	W84L013	SC20480	W84J013	W84L013	W84L013	W84L013	W85B021	W84L013	6544	W85B021
	* * * * * * * * * * * * * * * * * * *	**************************************	CHIP DETECTOR RESISTANCE	CHANGE TAIL GEARBOX OIL	ECS COMPRESSOR DRIVE BELT	MAIN GEAR BOX OIL FILTER	ENGINE PERIODIC	IBPT BLADE DISPLACEMENT	NO. 2 & 3 BRG OIL JETS	ENGINE TOPPING	ENGINE POWER ASSURANCE	#1 TORQUE TRANSDUCER(CAL)	#2 TORQUE TRANSDUCER(CAL)	ENGINE OIL FILTER	ENGINE PERIODIC	IBPT BLADE DISPLACEMENT	NO. 2 & 3 BRG OIL JETS	ENGINE POWER ASSURANCE	ENGINE OIL FILTER	ENGINE TOPPING	ENGINE OIL	ENGINE OIL	MAGNETIC PLUGS/CHIP DET	AXIAL COMPRESSOR
	. 6544 : SAVANNAH : 6154 : 6254	******** ACTION CODE	CHECK	SERVICE	INSP/CHK	INSP/CHK	INSPECT	INSPECT	TEST	CHECK	CHECK	TEST	TEST	REPLACE	INSPECT	INSPECT	TEST	CHECK	REPLACE	CHECK	REPLACE	REPLACE	INSPECT	INSPECT
	*		12001.1	12003.1	21400.2	63015.3	72001.0	72015.1	72012.1	76001.0	76001.5	770077	770077	79006.0	72001.0	72015.1	72012.1	76001.5	79006.0	76001.0	79006.0	79006.0	12001.1	71003.0
-	ASSEMBLY SERIAL NO OPERATING ACTIVITY FLIGHT HOURS PROJECT THRU	**************************************	120012	122013	214002	632018	720001	725052	725085	761019	761020	771013	771014	792013	720001	725052	725085	761020	792013	761019	790060	790060	120011	710025

<sup>\*</sup> INDICATES A COMPONENT WITH A QUESTIONABLE PART NUMBER. THE PART NUMBER OF THIS COMPONENT'S PART NUMBER. AT THE NEXT SCHEDULED MAINTENANCE OF THIS PART. CONTACT THE ACMS CONTRACTOR TO UPDATE THIS COMPONENT'S PART NUMBER.

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w	ue	อน	u	113	,

Answer the following questions on ACMS reports:

•	For additional information about types of reports and information contained in the ACMS refer to the
•	The common reports that are frequently generated by the ACMS user are
•	All uninstalled serial number tracked components must be accompanied by its
•	The MDL report is printed at a minimum, for each aircraft assigned to the unit.
•	The MDL computer generated report shows the projected scheduled maintenance of calendar and hourly tasks for a operating period.

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# **Feedback**

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	CGTO PG-85-00-10	3
2.	Configuration Report, Maintenance Due List, Significant Component History Report	3
3.	Significant Component History Report	6
4.	monthly	8
5.	two month	8

Performance ANALYZE Aviation Computerized Maintenance System. References Perform objectives listed below IAW one or more of the following references: • Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) • ACMS User's Guide, CGTO PG-85-00-10 Given access to the Aviation Computerized Maintenance System Performance Objective 1 (ACMS), **OBTAIN** the pertinent history data reports. Performance Given the pertinent history report, **INTERPRET** data. **Objective 2** Performance Given the pertinent history report, **IDENTIFY** trends and problem **Objective 3** areas.

6.A.05c

**Syllabus** 

6.A.05c Blank Page

Syllabus 6.A.06c

#### **Performance**

ORDER technical publications, directives, and manuals applicable to rating.

#### References

Perform the objectives listed below IAW one or more of the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), Chapter 5
- Directives, Publication and Reports Index, COMDTNOTE 5600
- Local station instructions (as applicable)

# Performance Objective 1

**STATE** the local procedures for ordering publications through the TIMOS via the Technical Librarian.

Performance Objective 2

**COMPLETE** the form for ordering publications as explained in Chapter 1 of the Directives, Publications, and Reports Index (DPRI), COMDTNOTE 5600 and explain the proper routing of the form.

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6.A.06c Blank Page

Syllabus 6.B.01

Performance	DIRECT personnel in the repair of aircraft systems.	
<ul> <li>Perform the objectives listed below IAW one or more of the following references:</li> <li>Aeronautical Engineering Maintenance Management Ma COMDINST M13020.1 (series) Chapters 1, 3, 4, 5, 9, &amp; applicable appendixes.</li> <li>Applicable aircraft Maintenance Procedure Cards (MPC)</li> </ul>		
	Applicable aircraft maintenance publications.	
Performance Objective 1	<b>REVIEW</b> applicable aircraft maintenance records to determine what maintenance must be accomplished.	
Performance Objective 2	PRIORITIZE aircraft maintenance repairs.	
Performance Objective 3	ASSIGN tasks to maintenance technicians as required.	
Performance Objective 4	VERIFY maintenance technicians' tasks are accomplished correctly and on time.	
Performance Objective 5	INFORM your supervisor of maintenance crew tasking progress.	

6.B.01 Blank Page

Syllabus	6.B.02		
Performance	CALCULATE and ANALYZE engine performance data.		
Performance Objective 1	Given an aircraft powerplant system, <b>COLLECT</b> data on engine performance as per applicable system IAW one or more of the following references:		
	HH-65A		
	• 1H-65A-2-1		
	• 1H-65A-11-72-2B2		
	• MPC Index, Chapters 70 and 76		
	НН-60Ј		
	• A1-H60CA-220-200		
	• A1-T700A-MMI-200		
	• MPC Index, Chapters 00 and 71		
	НС-130Н		
	• 1C-130H-2-71JG-00-2		
	• T.O. 2J-T56-56		
	• MPC Index, Chapter 72		
	HU-25A		
	• 1U-25A-2, Chapter 71		
	• 2J-ATF3-2-1		

MPC Index, Chapter 71

Continued next page

# Performance Objective 2

Given performance data for an aircraft powerplant system, **CALCULATE** data on engine performance for applicable system IAW one or more of the following references:

#### **HH-65A**

- 1H-65A-2-1
- 1H-65A-11-72-2B2
- MPC Index, Chapters 70 and 76

#### HH-60J

- A1-H60CA-220-200
- A1-T700A-MMI-200
- MPC Index, Chapters 00 and 71

#### HC-130H

- 1C-130H-2-71JG-00-2
- T.O. 2J-T56-56
- MPC Index, Chapter 72

#### **HU-25A**

- 1U-25A-2, Chapter 71
- 2J-ATF3-2-1
- MPC Index, Chapter 71

Continued next page

# Performance Objective 3

Given an aircraft powerplant system, **ANALYZE** acquired data to previous or baseline data on engine performance as per applicable system IAW one or more of the following references:

H	H-65A	
•	MPC Index, Chapter 76	
•	M13020.1 (series)	
•	Significant Component History Report (SCHR)	
H	Н-60Ј	
•	MPC Index, Chapter 00	
•	M13020.1 (series)	
•	Significant Component History Report (SCHR)	
H	С-130Н	<i>&amp;</i>
•	MPC Index, Chapter 72	
•	M13020.1 (series)	
•	Significant Component History Report (SCHR)	
H	U-25A	<i>&amp;</i>
•	MPC Index, Chapter 71	
•	M13020.1 (series)	
•	Significant Component History Report (SCHR)	

6.B.02 Blank Page

**Syllabus** 6.B.03 **Performance** SUPERVISE personnel during functional checks of aircraft systems. References Perform the objectives listed below IAW one or more of the following references: ? Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series) ? Applicable aircraft Maintenance Procedure Cards (MPC's) ? Applicable aircraft maintenance publications. Performance **REVIEW** applicable aircraft maintenance records and publications **Objective 1** to determine what type of functional check needs to be accomplished. **ASSIGN** tasks to maintenance technician as required. Performance **Objective 2 VERIFY** maintenance technicians' tasks are accomplished correctly and in a Performance timely manner. **Objective 3** Performance **INFORM** your supervisor of maintenance crew tasking progress.

**Objective 4** 

6.B.03 Blank Page

6.B.04 **Syllabus Performance** SUPERVISE personnel during flight control rigging. References Perform the objectives listed below IAW one or more of the following references: Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series) Applicable aircraft Maintenance Procedure Cards (MPC's) Applicable aircraft maintenance publications. Performance **REVIEW** applicable aircraft maintenance records and applicable Objective 1 publications to determine what type of aircraft maintenance needs to be accomplished. **ASSIGN** tasks to maintenance technicians as required. Performance

Performance Objective 3

Objective 2

**VERIFY** maintenance technicians' tasks are accomplished correctly and in a timely manner.

Performance Objective 4

**INFORM** your supervisor of maintenance crew tasking progress.

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6.B.04 Blank Page

**Syllabus** 6.B.05 Performance DIRECT the repair of aircraft structural damage. Performance Given a damaged aircraft structure, **SELECT** personnel to repair the **Objective 1** damage IAW local policy. Performance Given a damage inspection assessment of the structural damage by the **Objective 2** assigned repair personnel, **VERIFY** that the correct damage classification has been determined for the damage IAW the applicable aircraft Structural Repair Manual. Performance Given a damaged aircraft structure assessment, INFORM the **Objective 3** Maintenance Control supervisor of the time required to complete the repair IAW local policy. Performance Given a damaged aircraft structure, **SUPERVISE** the repair procedures performed by the assigned personnel IAW the applicable aircraft **Objective 4** Structural Repair Manual.

6.B.05 Blank Page

Syllabus 6.B.06

#### **Performance**

INSTRUCT personnel in the safe handling of cartridges and cartridgeactivated devices.

# Performance Objective 1

Given the applicable publications, **PREPARE** a training session on the safe handling of cartridges and cartridge-activated devices IAW one or more of the following references:

- Military Requirements for becoming a Senior Petty Officer, MRNSPO 0458 (series)
- ACMS (chapters 25, 26, 40, or 85 contain applicable information depending on the aircraft type)
- General Use Cartridges, Cartridge Actuated Devices for Aircraft, NAVAIR 11-100-1.1

\_\_\_\_\_\_

# Performance Objective 2

Given the applicable publication, **PRESENT** a training session on the safe handling of cartridges and cartridge-activated devices IAW the Military Requirements for becoming a Senior Petty Officer, MRNSPO 0458 (series).

6.B.06 Blank Page

Performance DIRECT shop maintenance. References Perform the objectives listed below IAW one or more of the following references: ACMS • Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), Chapters 1, 3, 4, 7, 8, 9, 12, and Enclosure 1 • Local station instructions (as applicable) Performance **ACQUIRE** shop maintenance tasking from the appropriate sources. **Objective 1** Performance **PRIORITIZE** shop maintenance tasks. **Objective 2** Performance **ASSIGN** tasks to shop personnel as required. **Objective 3** Performance **VERIFY** shop maintenance tasks are accomplished correctly and in a **Objective 4** timely manner. Performance **INFORM** your supervisor of shop maintenance tasking progress. **Objective 5** 

6.D.01c

**Syllabus** 

6.D.01c Blank Page

#### **Objectives**

To successfully complete this assignment, you must study the references and master the following objectives:

- **STATE** characteristics of the Serviceable Tag Materiel, DD-1574.
- **STATE** characteristics of the Unserviceable Tag Materiel, DD-1577-2.
- **STATE** characteristics of the Unsatisfactory Report (UR) Tag Materiel, CG-1577-A.
- **COMPLETE** statements pertaining to the Unsatisfactory Report (UR) (CG-4010).
- **COMPLETE** statements pertaining to material conditions.
- **COMPLETE** statements pertaining to the disposition of Type 1, 2, or 4 material.
- **COMPLETE** statements pertaining to the standard (reparable/unserviceable) management system.
- **LIST** the reference publications used for materiel preservation when ACMS MPC's are not applicable.

#### References

The information that you must study is contained in Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).

6.D.02c Overview

#### Introduction

This assignment introduces the process of the disposition of defective aircraft components.

#### **Notice to Student**

There is no informational text presented in this assignment, therefore, you must read and study the material in the references to prepare for the Self-Quiz, Pamphlet Review Quiz, and the EOCT.

In addition, the information presented in the references, your local station policy, and on-the-job experience should prepare you adequately to complete the performance objectives in the Syllabus at the end of this assignment.

# In This Assignment

This assignment contains the following:

Subject	Page
How to Complete This Assignment	3
Disposition of Defective Aircraft Components Self-Quiz	4
Disposition of Defective Aircraft Components Self-Quiz Feedback	6
Syllabus	9

### **Before You Begin**

To complete this assignment, it is recommended that you do the following:

- Get permission from the reference custodian to use the documents.
- Get a current copy of the reference listed; usually from Quality Assurance.
- Ensure that no pages in the reference are missing or damaged.
- DO NOT write in the reference or remove any pages.
- Return the reference to the custodian when you have finished the lesson.

#### **How to Proceed**

To successfully complete this assignment, follow the steps listed below:

Step	Action
1.	Read the objectives on page 1.
2.	Read and study the sections of the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) listed below and ensure that you can fulfill each objective listed on page 1.  Chapter 4 (Aircraft and Aeronautical Records and Reports), Paragraph C.1.a. through C.1.c.  Chapter 7 (Aviation Supply Support), Paragraphs E., F., I., and J.
3.	Take the self-quiz and then review the feedback. If you have no trouble with the self-quiz, you should be well prepared for the Pamphlet Review Quiz and the EOCT.

### 6.D.02c Disposition of Defective Aircraft Components Self-Quiz

#### Questions

Answer the following questions on the disposition of defective aircraft components:

1. What is the Serviceable Tag - Materiel, DD-1574 attached to? 2. Once attached, how long will the Unserviceable (Reparable) Tag - Materiel, DD-1577-2 remain with an unserviceable item? 3. What color is the Unsatisfactory Report (UR) Tag-Materiel, CG-1577-A? 4. Failures or unsatisfactory conditions of aeronautical materiel affecting SAFETY OF FLIGHT shall be reported by 5. On all failed components assigned a UR, the UR identification tag will also be affixed to the of the shipping container in a conspicuous place. 6. The term "A" Condition is also referred to as \_\_\_\_\_\_. 7. The terms "F" Condition, NON-RFI, Unserviceable, and Class 265 are used \_\_\_\_\_\_.

Continued next page

# Disposition of Defective Aircraft Components Self-Quiz (Continued)

6.D.02c

Questions (Continued)	8. Whenever Type 1 materiel has been repaired locally and returned to serviceable status, it shall be reported by
	9. Unserviceable Type 2 and Type 4 reparable materiel is returned to using the AMMIS generated NON-RFI turn-in document.
	10. DO NOT use for tagging equipment.
	11. A current Configuration Report must be included with those components listed on the ACMS Configuration Report as
	12. List below the reference publications used for materiel preservation when such procedures are not addressed in applicable ACMS MPC's or component maintenance manuals.

### Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section in the applicable reference.

Question	Answer	Reference
1.	serviceable equipment	COMDTINST M13020.1 (series) Chapter 4
2.	Until the item is serviceable	COMDTINST M13020.1 (series) Chapter 4
3.	Red/White/Blue	COMDTINST M13020.1 (series) Chapter 4
4.	message	COMDTINST M13020.1 (series) Chapter 4
5.	outside	COMDTINST M13020.1 (series) Chapter 4
6.	RFI	COMDTINST M13020.1 (series) Chapter 7
7.	interchangeably	COMDTINST M13020.1 (series) Chapter 7
8.	routine message	COMDTINST M13020.1 (series) Chapter 7

Continued next page

### Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
9.	ARSC	COMDTINST M13020.1 (series) Chapter 7
10.	wire	COMDTINST M13020.1 (series) Chapter 7
11.	next higher assembly	COMDTINST M13020.1 (series) Chapter 7
12.	NAVSUP PUB 502	COMDTINST M13020.1 (series)
	NAVSUP PUB 503	Chapter 7
	NA 15-01-500	
	NA 15-02-1 (T.O. 2-1-32)	

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Syllabus 6.D.02c

#### **Performance**

INSTRUCT personnel in the proper disposition of defective aircraft components.

# Performance Objective 1

Given the applicable publications, **PREPARE** a training session on the disposition of defective aircraft components IAW one or more of the following references:

- Military Requirements for becoming a Senior Petty Officer, MRNSPO 0458 (series)
- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- ACMS (for information you may use pertaining to component preservation)

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## Performance Objective 2

Given the applicable publication, **PRESENT** a training session on the disposition of defective aircraft components IAW the Military Requirements for becoming a Senior Petty Officer, MRNSPO 0458 (series).

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the manual used for aviation shop safety guidelines.
- **IDENTIFY** the manual used in the Coast Guard to identify the proper color scheme used within the shop/industrial area.
- **STATE** the note associated with precedence of safety manuals when there is a conflict between publication authorities.
- **STATE** the federal organization on which the Coast Guard bases its safety regulations.
- **STATE** the most effective safety features associated with shop equipment.
- **STATE** the safety measures used to prevent the accumulation of potentially hazardous static charges.
- **STATE** the inspection requirements for fire extinguishers.
- **STATE** the appropriate inspection requirements for a given situation.

#### References

The information in this assignment can be found in the following manuals:

- Safety And Environmental Health Manual, COMDTINST M5100.47 (series)
- Inspection and Proofload Testing of Lifting Slings for Aircraft and Related Components, NAVAIR 17-1-114
- 29 CFR 1900-1910 (series),
- 29 CFR 1910.1000 to End (series)
- National Fire Protection Agency (NFPA 101 & 105)
- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Colors and Coatings Manual, COMDTINST M10360.3 (series)

The purpose of this assignment is to introduce you to the general inspection references required while performing a shop safety inspection. Furthermore, the intent of this course is not to establish an actual inspection guideline or checklist. This course is for familiarization and is not to be construed as policy. Prior to conducting any inspection, read your unit's Station Instructions and applicable Coast Guard safety publications.

### In This Assignment

This assignment contains the following:

Subject	Page
Publications and References	3
Safety Program Responsibilities Guidelines	5
Occupational Safety and Health Administration	6
Unique Military Operations	7
How to Complete This Part of the Assignment	8
Inspecting Work Areas, Self-Quiz	9
Inspecting Work Areas Self-Quiz, Feedback	12
Syllabus	15

The number of manuals used by the Coast Guard for the safety program is mind boggling. For this reason this course will only list the most common publications and references used by all air stations.

### Precedence of Manuals

The following note is in regard to the authority of manuals when there is doubt of precedence or source.

#### **NOTE**

Published Coast Guard safety and environmental health instructions shall have precedence over all other standards regardless of their source.

### COMDTINST M13020.1 (series)

Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), chapter 12 provides general information and establishes shop safety standards and procedures for all USCG aviation maintenance facilities.

### COMDTINST M5100.47 (series)

Safety and Environmental Health Manual, COMDTINST M5100.47 (series) sets forth the Coast Guard's safety and environmental health policy and the elements of the Coast Guard Safety and Environmental Health Program, hearing conservation program, and assigns responsibilities for the implementation of those elements. This manual also specifies the safety and environmental health standards that are to be applied within the Coast Guard.

### COMDTINST M10360.3 (series)

Colors and Coatings Manual, COMDTINST M10360.3 (series) establishes mandatory standard paint schemes for floors, walls, walkways, and dynamic color codes for industrial and shop spaces. This manual also contains information on painting safety and basic confined space entry used within the Coast Guard.

Continued next page

#### **NAVAIR 17-1-114**

Inspection And Proofload Testing of Lifting Slings for Aircraft and Related Components, NAVAIR 17-1-114 provides instructions in the maintenance, inspection, and proofload testing of aircraft lifting and aircraft component slings. This manual should only be used when there are no Coast Guard directives to reference, such as, Mandatory Special Requirement Lists (MSRL).

#### NFPA 101 & 105

National Fire Protection Agency 101 &105, publishes standards for fire protection and prevention in industrial areas. Such as:

- Fire wall ratings
- Sprinkler location
- Types of fire extinguishers required

# 29 CFR 1910 (series)

The 29 Code of Federal Regulations (29 CFR) are government standards that require mandatory compliance by the Coast Guard under the provisions made by the Safety and Environmental Manual, M5100.47. The 29 CFR is provided as two separate volumes. They are as follows:

- 29 CFR Parts 1900-1910 (covers 1901-1910.999)
- 29 CFR Parts 1910 (covers 1910.999 to End)

They provide guidance in areas such as:

- Hoist inspections
- Fire protection requirements
- Personnel protection requirements
- Loft stowage guidelines
- Ladder safety guidelines
- Ventilation/Exhaust requirements

The Coast Guard Safety and Environmental Health Manual, COMDTINST M5100.47 (series) assigns responsibilities for the implementation and management of the safety programs for your unit.

### Commanding Officer

The Commanding Officer is responsible for ensuring that the personnel under their cognizance are provided a safe and healthful environment. They must also ensure that their facilities and operations comply with all applicable federal laws and regulations and Coast Guard instructions and standards pertaining to the health and safety of personnel and their families.

#### **Safety Officer**

The executive officer at a shore unit is normally designated as the senior safety officer of the unit.

#### Safety Supervisor

A unit safety supervisor is appointed by the executive officer to assist the safety officer when they are constrained by time or duties from performing the day-to-day tasks associated with program implementation.

### **Shop Supervisor**

As the shop supervisor you are responsible to ensure that the personnel around you practice safe work procedures at all times by:

- Ensuring the crew has proper safety equipment
- Ensure that your subordinates are properly trained in Coast Guard safety policies
- Analyzing the work under your supervision to anticipate and identify potential hazards
- Use administrative controls, such as reducing the duration of exposure

The Occupational Safety and Health Administration (OSHA) is a federal organization controlled by the Department of Labor. This organization administers and publishes regulations for the industrial work force throughout the United States. The Coast Guard uses these regulations as a guideline to establish its own policies.

### Inspectors Responsibilities

In today's Coast Guard there is a growing number of civilian personnel working side by side with active duty personnel. It is your responsibility while you are performing shop or industrial space safety inspections to be aware of both the Coast Guard and OSHA regulations.

#### OSHA Jurisdiction

Occupational Safety and Health Administration (OSHA) *shall be* authorized to conduct announced or unannounced inspections and evaluations at Coast Guard activities where deemed necessary. OSHA is allowed to inspect workplaces which are occupied by both military and civilian which are *not* uniquely military in nature.

OSHA inspectors and evaluators are authorized to do the following:

- Enter without delay, during regular work hours, any building, installation, facility, construction site, or other area, work place, or environment where work is performed by Coast Guard employees or contract employees.
- Inspect and investigate, during regular working hours, all pertinent conditions, structures, machines, appropriate devices, equipment, and materials.
- Question privately, any employee, supervisor, and/or facility official in charge.

#### OSHA Inspection Limitations

OSHA, even though a federal agency, has its jurisdictional limitations when it comes to the military.

#### **NOTE**

OSHA is not authorized to inspect workplaces or operations which are uniquely military.

Do to the nature of military operation and the risk involved with those operations the military has the option to set their own safety standards.

# Definition of Uniquely Military

The definition of uniquely military is defined as any workplace which is solely occupied by military personnel or secured for reasons of national security.

# Example Of Uniquely Military Operations

Examples of uniquely military operations include but are not limited to:

- Search and Rescue operations
- Military aircraft operations
- Operations of Coast Guard Cutters

### **Before You Begin**

To complete this part of the assignment, you should do the following:

- Get a current copy of the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), usually from the Quality Assurance office
- Ensure that no pages in the reference are missing or damaged
- Ensure that the correct updates are incorporated
- DO NOT write in the reference or remove any pages
- Return the reference to the custodian when you have finished the lesson

### **How to Proceed**

To successfully complete this assignment, follow the steps listed below:

Step	Action	
1	Read the objectives on page 1 of lesson 6.D.03c	
2	Read and study the material in the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) chapter 12, Aviation Maintenance Safety and ensure that you can fulfill the applicable objectives.	
3	Take the self-quiz	
4	Review the feedback	
	NOTE	
	If you have no trouble with the self-quiz, you should be well prepared for the Pamphlet Review Quiz and the EOCT.	

Continued next page

What manual would you use to determine the painting scheme a first-aid station located on a hanger deck?  A. Aeronautical Engineering Maintenance Management Man COMDTINST M13020.1 (series)
3. Colors and Coatings Manual, COMDTINST M10360.3 (series)
C. CFR 1910 (series)
D. Safety and Environmental Health Manual, COMDTINST M5100.17 (series)
If there is a conflict between the Coast Guard and OSHA, the regarding the precedence of safety manuals states that:
On which federal organization does the Coast Guard base its saregulations?

5. The most effective features for preventing unsafe operations and

injuries on powered machinery is improved machine

design, and \_\_\_\_\_

Continued next page

Questions
(Continued)

0.	mechanical deterioration, or damage that could result in failure or possible injury will be
7.	Lighting in the immediate area of shop equipment must be
8.	While a machine is in operation, guards shall not be
9.	When inspecting a shop equipped with a grinder, you should ensure that a is available for the operator.
10.	Hand tools that have mushroomed heads, defective handles, or worn parts which make them unsafe shall be
11.	To prevent the accumulation of static charges, flammable solvent containers must beand
12.	In a shop where oily wastes are generated, the waste must be disposed of in a
13.	Visual inspections of fire extinguishers shall be made

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### Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Question	Answers	Reference
1.	Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)	3
2.	В	3
3.	Published Coast Guard safety and environmental health instructions shall have precedence over all other standards regardless of their source	3
4.	Occupational Safety and Health Administration (OSHA)	6
5.	installation of protective mechanical guards	M13020.1 (series) Chapter 12
6.	removed from service for repairs	M13020.1 (series) Chapter 12
7.	adequate to eliminate glare or shadows	M13020.1 (series) Chapter 12
8.	removed	M13020.1 (series) Chapter 12
9.	protective face shield	M13020.1 (series) Chapter 12

Continued next page

### Feedback (Continued)

This is a continuation of the feedback table on the preceding page.

Question	Answer	Reference
10.	removed from service	M13020.1 (series) Chapter 12
11.	electrically grounded and bonded	M13020.1 (series) Chapter 12
12.	self-closing air-tight metal can	M13020.1 (series) Chapter 12
13.	monthly	M13020.1 (series) Chapter 12

6.D.03c Blank Page

Syllabus 6.D.03c

#### Performance

INSPECT shop work areas, tools, and aviation equipment for safety compliance.

#### References

The following is a list of references that can be used to research the applicable safety information prior to conducting an inspection on the applicable equipment or shop work area.

- Safety And Environmental Health Manual, COMDTINST M5100.47 (series)
- Inspection and Proofload Testing of Lifting Slings for Aircraft and Related Components, NAVAIR 17-1-114
- 29 CFR 1900-1910 (series), & 29 CFR 1910.1000 to End (series) (normally located in the Facilities Engineering office)
- National Fire Protection Agency manual (NFPA 101 & 105) (normally located in the Facilities Engineering office)
- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Colors and Coatings Manual, COMDTINST M10360.3 (series)
- Local station instructions

### Performance Objective 1

Given a work area/tools/aviation equipment, **RESEARCH** the applicable safety regulations IAW one or more of the above publications.

### Performance Objective 2

Given a shop work area, **INSPECT** the work area to ensure safety compliance IAW the applicable publications.

### Performance Objective 3

Given AMT tools and aviation equipment, **INSPECT** the tools and aviation equipment IAW the applicable publications.

6.D.03c Blank Page

**Syllabus** 6.D.04c Performance COORDINATE calibration and repair of special tools and measuring equipment. References Perform the objectives listed below IAW one or more of the following references: • Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series), Chapter 9 • TMDE Calibration Notes, Maintenance Data Collection Codes, AFTO 33K-1-100-1 • Local station instructions (as applicable) Performance **IDENTIFY** special tools or measuring equipment-requiring Objective 1 calibration. Performance **DETERMINE** the source for calibration of special tools or **Objective 2** measuring equipment. Performance **STATE** the routing procedures at your unit for special tools and **Objective 3** measuring equipment requiring calibration. Performance **STATE** the procedures at your unit for scheduling, and tracking the **Objective 4** status of special tools and measuring equipment requiring calibration.

6.D.04c Blank Page

### APPENDIX A, PAMPHLET REVIEW QUIZ

1. To requisition parts, tools and materials, you would use form or the unit's equivalent?	5. Which form is used to make an open market purchase?
A. CG-4200 B. CG-4400 C. CG-4940 D. DD-4940	<ul> <li>A. D.O.T. Procurement Request Process Rapidly Form</li> <li>B. D.O.T. Small Purchase Request</li> <li>C. CG-4315</li> <li>D. CG-5155</li> </ul>
2. Which commandant instruction provides details on how to make an open market purchase?	6. Which of the following ACMS reports listed below can be used to provide component history to form trend analysis and identify problem areas?
A. M3502.14 B. M4000.16 C. M4200.13 D. M5210.5	<ul> <li>A. Configuration Report</li> <li>B. Maintenance Due List</li> <li>C. Significant Component History Report</li> <li>D. All of the above</li> </ul>
3. An open market purchase must be set	
aside for a small business if the purchase price is between	7. What manual is used to find additional information on ACMS reports used by
A. \$2,500.01, \$100,000.00 B. \$10,000.00, \$100,000.00	maintenance personnel?
C. \$15,000.00, \$200,000.00 D. \$25,000.00, \$200,000.00	<ul><li>A. M3710.1</li><li>B. M5181</li><li>C. Forms and Reports</li><li>D. CGTO PG-85-00-10</li></ul>
4. To make an open market purchase over \$2,500.01 and up to \$100,000.00, competitive price quotes must be obtained from how many sources, unless the vendor is a sole source?	8. The Configuration Report primarily lists all sub-components of a major assembly tracked by
A. 1 B. 2 C. 3 D. 4	<ul><li>A. part name</li><li>B. stock number</li><li>C. serial number</li><li>D. part number</li></ul>

### APPENDIX A, PAMPHLET REVIEW QUIZ

9. Which component material condition tag is attached to a component, unserviceable or not, when special handling is required?	<ul><li>13. What type of materiel shall be used to eliminate damage to a component when tagging?</li><li>A. Soft</li></ul>
A. DD-1572	B020 inch safety wire
B. DD-1572-A	C. Break-away wire
C. DD-1577	D. Any material that ensures
D. CG-1577-A	security
10. When a component is shipped without an attached UR, after how many days from the original shipment date will ARSC wait before generating a letter to the command requesting completion of a UR?	14. When Auxiliary Power Unit preservation procedures are not given in ACMS MPCs, which publication could be utilized?
	A. NAVSUP PUB 502
A. 10	B. NAVSUP PUB 503
B. 12	C. NAVAIR 15-01-500
C. 14	D. NA 15-02-1 (T.O. 2-1-32)
D. 16	
	15. Machine control switches shall have
11. The term "class 265" is	all selective positions
interchangeable with Condition code	A. detented
A. F	B. illuminated
B. G	C. properly identified
C. S	D. color-coded
D. U	D. Color coded
12. Following receipt of shipping orders, Type 1 materiel shall be shipped as soon as	16. Any equipment found defective during visual inspections, or at any other time, shall be
practical but not later than days.	A removed from service for
Λ 5	A. removed from service for
A. 5 B. 10	repairs  B. used on a limited basis
C. 14	C. disposed of locally
D. 15	D. surveyed
<b>₽.</b> 1∂	D. Buiveyed

### APPENDIX A, PAMPHLET REVIEW QUIZ

- 17. All fire extinguishers shall be inspected, serviced, and maintained in accordance with
  - A. AFTO 00-25-172
  - B. manufacturers instructions
  - C. COMDTINST M13020.1 (series)
  - D COMDTINST M11000.1 (series)
- 18. If a static ground is mechanically damaged, it must be \_\_\_\_\_.
  - A. tested annually
  - B. removed
  - C. repaired only
  - D. repaired and re-tested
- 19. What manual provides general information on a Coast Guard aviation unit's shop safety program?
  - A. NAVAIR 17-1-114
  - B. 29 Code of Federal Regulations
  - C. Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
  - D. Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

- 20. To properly identify first aid stations within an industrial area, you should paint the first-aid station IAW which of the following publications?
  - A. 29 Code of Federal Regulations
  - B. Colors and Coatings Manual, COMDTINST M10360.3
  - C. Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
  - D. Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series)
- 21. When there is a disparity between Coast Guard safety publications and other safety publications, which publication has precedence?
  - A. US Code 27.1900 (series)
  - B. 29 CFR (code of Federal Regulations)
  - C. OSHA regulations
  - D. Coast Guard safety publications
- 22. Coast Guard safety regulations are based on the guidelines established by
  - A. MSA
  - B. NISH
  - C. NFPA
  - D. OSHA

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### APPENDIX B, PAMPHLET REVIEW QUIZ ANSWER KEY

QUESTION	ANSWER	REFERENCE
1.	C	6.A.02c Pg. 8
2.	C	6.A.02c Pg. 14
3.	A	6.A.02c Pg. 15
4.	C	6.A.02c Pg. 15
5.	A	6.A.02c Pg. 17
6.	D	6.A.05c Pg. 3
7.	D	6.A.05c Pg. 3
8.	C	6.A.05c Pg. 4
9.	D	M13020.1E Chapter 4
10.	C	M13020.1E Chapter 4
11.	A	M13020.1E Chapter 7
12.	D	M13020.1E Chapter 7
13.	A	M13020.1E Chapter 7
14.	D	M13020.1E Chapter 7
15.	C	M13020.1E Chapter 12
16.	A	M13020.1E Chapter 12
17.	В	M13020.1E Chapter 12
18.	D	M13020.1E Chapter 12
19.	D	6.D.03c Pg.3
20.	В	6.D.03c Pg. 3
21.	D	6.D.03c Pg. 3
22.	D	6.D.03c Pg. 6

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### APPENDIX C, REFFERENCES

<b>Publication Number</b>	<b>Publication Name</b>
29 CFR 1900-1910 (series)	Code of Federal Regulations
29 CFR 1910.1000 to End (series)	Code of Federal Regulations
CGTO PG-85-00-10	ACMS Users Guide
CGTO 1C-130-4	Illustrated Parts Breakdown HC-130
CGTO 32A-25A-2	Ground Support and Related Equipment Manual HU-25
CGTO 32H-65A-2	Illustrated Tool and Equipment Manual HH-65A
CGTO A1-H60CA-GSE-400	Illustrated Tool and Equipment Manual HH-60A
COMDTINST M10360.3 (series)	Colors and Coatings Manual
COMDTINST M13020.1 (series)	Aeronautical Engineering Maintenance Management Manual
COMDTINST M4200.13 (series)	Simplified Acquisition Procedures Handbook
COMDTINST M4400.19	Supply Policy and Procedures Manual
COMDTINST M5100.47 (series)	Safety and Environmental Health Manual
GSA Supply Catalog	General Services Administration Supply Catalog
NAVAIR 17-1-114	Inspection and Proofload Testing of Lifting Slings for Aircraft and Related Components
NFPA 101 & 105	National Fire Protection Agency
CGTO PG-85-00-10	ACMS User's Guide

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### APPENDIX D, STUDENT FEEDBACK FORM

Instructions	Please use this form for any feedback you may have concerning this
	course. Submit your recommendations IAW instructions on page D-2.

Note: Use the reverse side of this page if more space is needed.

**How?** Note your suggestions, corrections, and comments below:

Page	Location on Page	Recommendations

**Your Comments** 

If you were writing this pamphlet, what improvements would you make? What was good about it? What didn't you understand? Please be specific in your comments/suggestions.

**To Contact You** Please provide the following information so that we can contact you if needed.

Name	Unit	Phone
		( )

### APPENDIX D, STUDENT FEEDBACK FORM

### Submit Suggestions

After completing this form please mail, FAX, or phone your information to:

Commanding Officer PHONE:(252) 335-6418 U.S. Coast Guard Aviation FAX:(252) 335-6103 Technical Training Center

Attn: AMT Subject Matter Specialist (NRT)

Elizabeth City, NC 27909-5003



# **Aviation Maintenance Technician Second Class**



U.S. Coast Guard Pamphlet No. A20601 (05/98, Change 1)

### **Aviation Maintenance Technician Second Class**

Creation Date: May 1998

Revision Date: This course incorporates

Errata 1 dated 01 June 1999 and Errata 2 dated 01 December 1999

Next Review Date: May 2001

Nonresident Training U. S. Coast Guard Aviation Technical Training Center Elizabeth City, NC 27909-5003 (252) 335-6418

QUESTIONS ABOUT THIS TEXT SHOULD BE ADDRESSED TO THE SUBJECT MATTER SPECIALIST FOR THE **AVIATION MAINTENANCE TECHNICIAN** (AMT) RATING

### References

### Selected References

This pamphlet contains original material developed at AVTECHTRACEN Elizabeth City, NC. The references used to develop this pamphlet are listed throughout the text under the corresponding performance qualification number. A complete list of these references is provided in Appendix C.

#### Introduction

The purpose of this pamphlet is to provide guidance and references to assist you in completing the AMT2 Performance Qualifications and the End-of-Course Test.

### **Important Note**

This text has been compiled for TRAINING ONLY. It should NOT be used in place of official directives or publications. The text information is current according to the references listed. You should, however, remember that it is YOUR responsibility to keep up with the latest professional information available for your rate. Current information is available in the Enlisted Qualifications Manual, COMDTINST 1414.8 (series).

#### **How to Proceed**

This pamphlet contains assignment objectives and syllabus objectives which are used to describe the tasks you will need to perform to satisfy the requirements of the performance qualifications.

- For the assignments: Read the text and answer the self-quiz at the end of each assignment. The 5.B.GTG assignment should be completed before attempting to complete any of the Aircraft Maintenance performance qualifications (5.B. series).
- For the syllabus: Read the performance, then read the syllabus performance objectives and refer to the applicable references listed to perform the task. Performance of these objectives should be completed on your assigned aircraft type (only one type is required).

-The initial line (\_\_\_\_\_\_) in the syllabus portion is used to keep track of each task you have completed. This entry should be completed by a petty officer at least one pay grade higher than the student.

### End-of-Course Test (EOCT)

To prepare for the EOCT, read the assignment objectives and carefully study the information contained in the text. You should also review the self-quiz for each assignment along with the pamphlet review quiz. Answers and references are found on the page following each quiz. Remember, these questions are only samples of the types of questions on the EOCT.

The syllabus performance objectives will NOT be tested on the EOCT due to their aircraft specific nature.

### **Notice to Student (Continued)**

### Performance Qualifications Sign-Off

As PROFICIENCY in each performance qualification is demonstrated, the DATE and INITIALS columns of the Record of Performance Qualifications (CG-3303C-19, Tab-1 of this pamphlet) should be completed by your supervisor. A "Notice to Supervisor" page is included to provide guidance for your supervisor. Ensure that your supervisor reads the instructions on that page. Also, Tab-1 should be used as your permanent record documenting the completion of each performance qualification. It is up to YOU to ensure that this documentation is complete in order to be considered eligible for the Service Wide Exam (SWE).

This pamphlet was developed as a guide to assist you in completing your performance qualifications. You should **USE IT**.

## Performance Qualification Numbers

The performance qualifications beginning with a "5" are the requirements for qualifying for E-5. Also, performance qualifications ending in "c" are common for all aviation ratings. The assignments need not be completed in any specific order.

### Student Feedback Form

A student feedback form (Appendix D) is provided for you to submit recommendations to the subject matter specialist. As you read the training material, you may have comments, such as

- suggestions for adding or deleting information,
- notations of errors in the text (include page number and your reference material), or
- questions about the text or a practice exercise.

Write your comments in sentence form on Appendix D. Tear it out of the pamphlet and mail it through your unit's mail room. The subject matter specialist will review all submissions received.

### SWE Study Suggestions

Servicewide exam questions for your rate and pay grade are based on the Professional and Military Requirements sections of the Enlisted Qualifications Manual. If you use the references listed in your rating section of the Enlisted Qualifications Manual, COMDTINST 1414.8 (series), you should have good information for review when you prepare for your servicewide exam.

#### Introduction

The purpose of this pamphlet is to provide guidance and references to assist the student in completing the AMT2 performance qualifications and the EOCT. It also identifies what the student is expected to know and demonstrate for each performance qualification.

### **NOTE**

This text has been compiled for TRAINING ONLY. It should NOT be used in place of official directives or publications. The text information is current according to the references listed to date.

### Supervisor Guidelines

Supervisors should follow the guidelines provided below to improve the consistency of the training process:

- The syllabus portion of this pamphlet contains objectives for each performance qualification. The student should be able to demonstrate proficiency in each of the objectives in order to meet the requirements for the performance qualification. The supervisor should use the syllabus to determine if the student is proficient in each performance qualification.
- An initial line (\_\_\_\_\_\_\_) is provided to keep track of each objective the student has completed, and should be initialed by a petty officer at least one pay grade higher than the student. The initial line also provides a quick way to chart the student's progress and allows you, the supervisor, to assess the student's training needs and to plan accordingly.
- The supervisor should provide the discrepancy information or scenarios for the syllabus objectives requiring this information. It's up to the supervisor to decide whether or not to use actual discrepancies such as CG 4377 Part III or CG 4377B (No Fly) entries or to give the student realistic scenarios to work on. Again, the supervisor should decide what method will work best for their training environment.

Continued next page

### **Notice to Supervisor (Continued)**

### Performance Qualifications Sign-Off

#### **NOTE**

It is highly recommended that all supervisors review the information covered in the "Administration" section of the Enlisted Qualifications Manual, COMDTINST 1414.8 (series) before any performance qualifications are signed-off or waived.

As PROFICIENCY in each performance qualification is demonstrated, the DATE and INITIALS columns of the Record of Performance Qualifications (CG-3303C-19, Tab-1 of this pamphlet) should be signed-off by the student's supervisor. Also, Tab-1 should be used as the student's permanent record documenting the completion of each performance qualification.

### For More Information

For more detailed information on completion of the Record of Performance Qualifications, refer to (COMDTINST M1414.8, series).

### In This Pamphlet

### **TITLE**

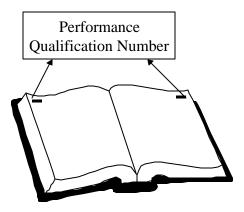
**PAGE** 

References	ii
Notice to Student	iii
Notice to Supervisor	V

Performance Qualification Assignments

### **ASSIGNMENTS**

The assignments are numbered and arranged in the same manner as are the performance qualifications; Alpha-Numeric. The actual performance qualification number is listed in the upper-outer corner of each page which allows you to quickly scan the pages in order to find the specific performance qualification section. See the example below:



#### **APPENDIXES**

Pamphlet Review Quiz	<b>A-</b> 1
Pamphlet Review Quiz Answer Key	B-1
References	C-1
Student Feedback Form	D-1
AMT Record Of Performance Qualifications Ta	b-1

Syllabus 5.A.01c

### **Performance**

**COMPLETE** assigned aircraft Aircrewmember Syllabus.

### Performance Objective

Given an assigned aircraft type, **COMPLETE** the applicable Aircrewmember course and the syllabus IAW your assigned station's instructions.

Ø

### **NOTE**

After being assigned an aircraft type, contact your unit's Educational Services Officer for course enrollment.

5.A.01c Blank Page

Syllabus 5.A.02c

#### **Performance**

ORDER aircraft parts.

### Performance Objective 1

Given the name of an aircraft part and the name of the related system, **RESEARCH** the information needed to order the part using the applicable aircraft Illustrated Parts Catalogs and the Federal Logistics Data System (Fed Log).

### **NOTE**

The E-4 Aviation Administration Pamphlet #A1AA03, included with the Airman Course, contains the information required to help you complete this performance objective.

### Performance Objective 2

Using the information obtained from performance objective 1, **SUBMIT** an aircraft parts requisition to supply IAW the Aeronautical Engineering Maintenance Manual, COMDINST M13020.1 (series) and local station instructions.

\_\_\_\_\_*M* 

5.A.02c Blank Page

### **Objectives**

To successfully complete this assignment, you must study the text and master the following.

- **STATE** in writing how often a shop technical publications audit should be completed.
- **STATE** in writing the two primary functions of a technical library audit.
- **STATE** in writing the time allowed for completion of a shop technical publications audit.
- **VERIFY** (compare) publication status on an audit report.
- **ANNOTATE** (write) correct entries on an audit report that contains discrepancies

### References

The information contained in this assignment can be found in the Technical Information Management and Ordering System (TIMOS) Users Manual, CGTO PG-85-00-50 and ACMS cards.

5.A.03c Overview

### Introduction

In this reading assignment you will complete procedures required to perform an audit of your shop technical publications library.

Aircraft technicians frequently use technical publications and directives such as ACMS cards and maintenance manuals to perform complex aircraft maintenance.

One of your tasks may be to perform periodic audits of your shop or workcenter technical library to verify all publications and directives contain the most current changes. This will ensure that all technicians are received valid maintenance information

### In This Assignment

Subject Pa	ge
Technical Information Management and Ordering System	.3
Technical Library Audits	4
Publication Audit Report	7
Audit Report Information	9
Performing Publications Audit	.10
Publication Audit Practice	.17
Publication Audit Feedback	.23
Technical Publications Audit Self-Quiz	.24
Technical Publications Audit Self-Quiz Feedback	.25
Syllabus	26

In this section we will discuss a general background of the Technical Information Management and Ordering System (TIMOS) used by the Coast Guard. This instruction will provide some insight on how a technical publication audit fits into the TIMOS system.

## Background

TIMOS is a computerized publication ordering and inventory management system designed to assist air stations with establishing and maintaining their technical publication requirements. This system also allows authorized users to approve or reject orders, as well as track publication inventories at air stations. The system functions have been designed to correspond to the order of events in which a publication order is processed.

# Air Stations/ARSC Communications

This system allows Coast Guard air stations to communicate with the technical publications section at AR&SC to:

- Order Publications
- Establish or change initial publication distribution
- Follow up/cancel existing orders

## Publication Updates

Once the unit's publication requirements are transmitted to the TIMOS computer database, all technical publications will be on automatic distribution for necessary periodic updates.

Although the TIMOS publication tracking software is an excellent tool for managing and maintaining a unit's publication library. An audit of all-technical publications and directives is required every four months as a check-and-balance to the system.

This audit is tracked on ACMS and is signed-off by the librarian when completed.

## Location of Technical Libraries

Not all of a unit's technical publications and directives are located in a central QA library. Extra copies of applicable publications and directives are also located in shops or work center technical libraries. Some publications may be unique to your shop alone.

## Your Responsibilities

Your responsibilities during the audit will be to assist the librarian by cross-checking your shop publications and directives with the technical librarians records to ensure complete accuracy.

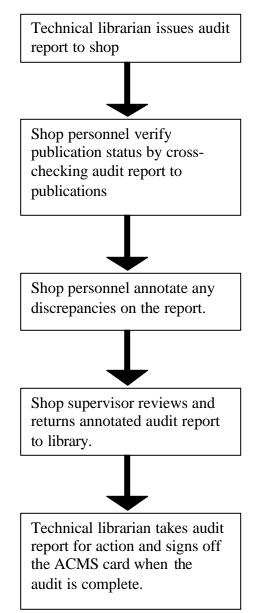
# Function of a Publication Audit

The two primary functions of a publication audit are to:

- Ensure all of your technical publications and directives contain most current updated information.
- Provide an opportunity to review your publication requirements, and make recommendations for additions or deletions to the shop technical library.

## **Audit Process**

The flowchart below depicts a typical technical library audit process:



5.A.03c Blank Page

## **Definition**

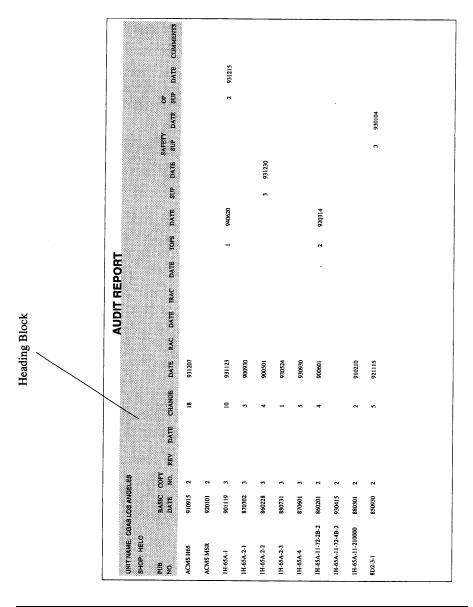
The Publication Audit Report is a computer printout generated by the TIMOS system. It is a comprehensive listing of a shops technical publications including all updates that have been issued.

# **Purpose**

The technical librarian issues an audit request to each shop every four months, or at the shop's request. This report allows shop personnel to verify the status of their shop's publications by cross-checking the list with each publication.

# Audit Report Example

Below is an example of a typical shop publications Audit Report.



In this section we will explain the information displayed on a typical publication Audit Report. Most of the terms and information contained on the report are self-explanatory, but there are some items that you may be unfamiliar with.

# Heading and Information Blocks

In the illustration on the preceding page, the Audit Report is divided into two major sections as follows:

The shaded area of the example highlights the "Heading Block" which is common to all Audit Reports. The heading block contains several categories used to divide data displayed in the "Information Block" section.

The unshaded area of the example depicts an information block, which contains data about your particular shop library contents.

# Heading Categories

The first column of the Heading Block is the publication number followed by the basic date. The copy number column is for the librarians use only so it is disregarded. The next 16 columns list each type of update that may be issued for a publication followed by its' effective date. The last column is for any comments that the librarian may have entered into the database about the publication.

In this section we provide guidance on how to perform a technical publication audit with a condensed demonstration. In this scenario, the librarian sends a memorandum (memo) along with the audit report outlining what must be done. At your unit, you may or may not receive a similar memo. You must complete the audit and return the report to the library within five working days.

#### Scenario

Petty Officer Gimble, of the helo shop, has received a memo with an attached audit report (see next page) from the unit technical librarian requesting an audit of the helo shop technical library. The memo below provides instructions on how to complete the audit.

## Library Audit Memo Example

The following example gives PO Gimble directions on completing the audit.

From: AST1 Roscher To: All Shops Supervisors

- 1. It is time for the technical publication library audit. I am requesting your assistance in performing an audit of your respective shop technical library. Listed below are the steps required to complete your audit.
  - A. Verify that the attached Audit Report is for your shop.
  - B. Ensure all publication updates that have been issued by QA are installed in your shop publications.
  - C. Locate each manual on your report and verify the following information:
    - (1) Basic Date—Should match basic date on publication title page.
    - (2) All updates listed on the report are installed in your publications.
  - D. You may disregard the copy number column.
  - E. All entries/corrections to the audit report should be in red ink. As each publication is checked, place a checkmark next to the manual number, If there are discrepancies, please circle the incorrect information and enter the actual information from the publication.
- 2. After all manuals have been checked return the annotated Audit Report to AST1 Roscher within five working days. Thank your for your assistance.

AST1 Roscher

Technical Librarian

# Audit Report Example

Below is an example of the Audit Report PO Gimble received for the Helo shop.

							'												
UNIT NAME: CGAS ELIZABETH CITY	ELIZABE	THCITY					4	NODI	<u> </u>	AUDIT REPORT	_								
SHOP: HELO																			
PUB NO.	BASIC	COPY NO.	REV	DATE	CHANGE	DATE	RAC	DATE	IRAC	DATE	TOPS	DATE	SUP	DATE	SAFETY SUP	DATE	ao sons	DATE	COMMENTS
A1-H60CA-IPB-450 930808	930808	7				940115			7	931202									
A1-H60CA-140-200 930131	930131	2																	
A1-H60CA-140-400 930131	930131	6			-	930808													
A1-H60CA-150-100 910531	910531	3			e	930205													
A1-H60CA-150-200 910531	910531	3			7	930205													
A1-H60CA-150-300	900100	3			2	930205													
A1-H60CA-150-400	920531	3			3	930808													
A1-H60CA-220-100	910531	2			-	920531													
A1-H60CA-220-200	910531	7			4	930808											-		
A1-H60CA-220-300	920531	7			٣	930808			9	931217									
A1-H60CA-220-400	920531	2			۶.	921115	2	930507											
A1-H60CA-240-100	920815	2			_	930205													
A1-H60CA-240-200	920815	7			2	930808													
													j						

# Scenario (Continued)

After ensuring this audit report (see page 11) is for the helo shop, PO Gimble located the manual number A1-H60CA-220-300, and opens the manual to the title page (see next page).

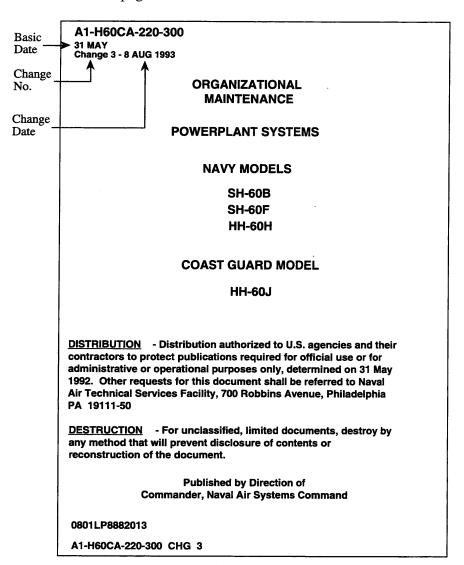
On the publication title page, PO Gimble notes the following information:

- Basic Date 31 May 92
- Change Number Change 3
- Change Date 08 Aug 93

This information is consistent with the audit list shown on the preceding page.

## **Title Page**

Below is the title page for technical manual A1-H60CA-220-300.



# Scenario (Continued)

PO Gimble verifies all the changes shown on the List of Effective pages (below) are installed by cross checking actual pages in the manual.

According to the List of Effective pages, Changes 1-3 are effective Rapid Action Changes (RAC) should be installed.

All changes and RACs are confirmed to be installed.

A1-H60CA-						
Change 3- 8 Au						Page A
	NUMERIC	CAL INDEX OF EFFECTIVE	<u>VE WORK P</u>	ACKAGES/F	PAGES	
		LIST OF CURREN	NT CHANGES			
Original 0						
	08 August 1992					
	15 January 1993					
	05 February 1993					
RAC 2						
Change 3	08 August 1993					
superseded and of accordance with a applicable work p	leleted work package applicable regulations ackage. The portion	the manual are listed in this s/pages. Superseded and de . If changed pages are to be of text affected in a changed of each column of text. A ch	eleted classifie issued to a w or revised wo	d work packag ork package, rk package is	ges/pages shall be de- insert the changed pa indicated by change b	stroyed in ges in the ars or the
WP				WP	Title	
Number	Title			Number	riue	
Number	riue			Number		
Page A	Numerical Index of	f Effective Work		007 00 -	Oil System	
ū	Packages/Pages			008 00	Fuel Boost pur	ıp qı
	• •			009 00	Torque and Ov	erspeed
					Sensor	
TDPR-1	List of Technical P	ublications Deficiency		010 00	Electrical Contr	ol Unit
	Reports Incorporat	ted		011 00	Air Inlet	
HMWS-1	Hazardous Materia	als Warning		012 00	Therocouple As	sembly
001 00	Alaphabetical Inde	x		013 00	Start Speed Sw	ritch
002 00	Introduction			014 00	Engine Control	Quadrant
003 00	Engines			015 00	Exhuast Modu	e
004 00		nge Assembly (QECA)		016 00	Load Demand	
005 00	Accessory Gear B	OX		017 00	Hover Infared S	Suppression
006 00	Radial Drive Shaft			018 00	System Anti-Ice Start/B	leed Valve
TOT	AL NUMBER OF P	AGES IN THIS MANUAL	IS 243 CON	SISTING OF	THE FOLLOWING	ì:
WP/Page	Change	WP/Page	Change		WP/Page	Change
No.	No.	No.	No.		No.	No.
Title	3	006 00	2		013 00	2
A		1-17			1-12	2
TDPR-1		1-18 Blank			014 00	
HMWS	3	007 00	3		1-20	
001 00		1-8	3		015 00	3
1-5	3	008 00	3		1-9	3
6 Blank	3	1-14	3		10 Blank	
002 00	3	009 00	1		016 00	3
1-14	3	1-12	1		1-17	
003 00		010 00	3		18 Blank	
1-26		1-7			017 00	
004 00	0	8 Blank	3		1-23	
1-12		011 <b>00</b> 1-10			24 Blank 018 00	

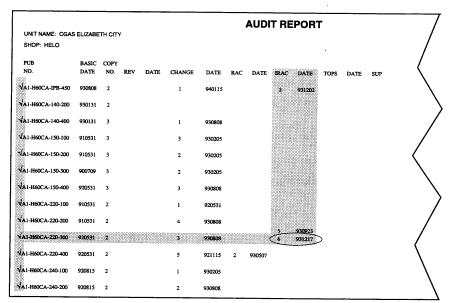
# Scenario (Continued)

PO Gimble turns to the front of the manual looking for Interim Rapid Action Change (IRAC) #6, which according to the Audit Report shown below should be the latest IRAC installed in this publication. He doesn't find IRAC #6 but does find IRAC #5 dated 930923 (see example on next page).

This discrepancy is annotated on the Audit Report by circling the incorrect information, and writing in actual information from the manual update.

# Annotated Audit Report

After checking all the publications, PO Gimble annotated the Audit Report as shown below. The shaded areas highlight the information that PO Gimble was looking for and the entries he was requiring to make.



## Example of Latest Supplement

The IRAC shown below is an example of the latest supplement installed in A1-H60CA-220-300.

ZZCCGGBA817

RUHGOAA T COMCARGRU SEVEN

RUHFPAA T HELOSUPPSECRON FIVE

RUHNABE T USS ABRAHAM LINCOLN

P 231920Z SEP 93 ZFD

FROM DPRO SIKORSKY STRATFORD CT//RAE60//

TO AIG ONE ONE SIX FIVE

ONE ONE THREE SEVEN FIVE

ONE ONE FOUR TWO ONE

ACCT DSGA4D

BT

UNCLASS//NO5600//

SECTION ONE OF ONE

SUBJ: HH-60 PROGRAM INTERMIN RAPID ACTION CHANGE NO.5 TO TECHNICAL MANUAL A1-H60CA-220-300,

POWERPLANT SYSTEMS, ORGANIZATIONAL LEVEL

MAINTENANCE MANUAL.

REF: A1-H60CA-220-300, WP 005 00, PAGE 2, STEP 5A.

1. PEN AND INK CHANGES TO THE TECHNICAL CONTENT OF A MANUAL ARE NOT AUTHORIZED. THE FOLLOWING TECHNICAL CONTENT CHANGE INFORMATION APPLIES TO THE ABOVE REFERENCED PAGE AND PARAGRAPH UNTIL A FORMAL CHANGE IS RELEASED.

REVISE FIRST BULLET OF CAUTION PRECEEDING STEP 5A TO READ AS FOLLOWS:

ENGINE MUST BE SHUT DOWN AND ALLOWED TO COOL TO A TGT OF 80 DEGREES C (176 DEGREES F) OR BELOW BEFORE CLEANING SOLUTION IS SPRAYED INTO ENGINE.

ВΤ

#8323

In this section you will practice performing publication audits on selected technical manuals.

This practice exercise consists of a scenario, a procedure table, an example Audit Report, and an example List of Effective Pages. This information is located on the following pages.

The manual selected for this exercise may or may not contain discrepancies in accordance with the information provided in the Audit Report.

### **Directions**

Read the scenario below carefully and follow the procedure table on the next page to complete the exercise. Review the example publication (TO 8D2-3-1) on page 20-22 and annotate the Audit Report on page 19 with you results.

Try to complete the practice exercise without assistance, but should you have trouble, review the appropriate section of this assignment.

#### Scenario

You are stationed at Air Station Los Angeles. The technical librarian sends you an audit report (page19) and a memo requesting you to perform an audit of the helo shop library.

You have started your task, and up to now you have found no discrepancies. You locate the last manual on the audit report, T.O. 8D2-3-1, and compare the data to the title page, the List of Effective pages, and the Safety Supplement.

Verification indicates that all the changes up to and including Change 4 are installed in T.O. 8D2-3-1.

While performing the audit, you determine that your shop publication requirement have not changed.

# **Procedure Table**

Follow this procedure table to complete the practice exercise.

Step	Action
1	Verify Audit Report is for your shop.
2	Verify basic date of manual.
3	Verify latest revision and date.
4	Verify latest change number and date.
5	Verify all changes shown on the list of effective pages are installed in the manual.
6	Verify the numbers and the dates of the following applicable updates: Rapid Action Change (RAC), Interim Rapid Action Changes (IRAC), Technical Ordering Page Supplements (TOPS), Supplements (SUP), Safety Supplements (SAFETY SUP), Operational Supplements (OP SUP).
7	Place a check mark next to manuals as they are completed.
8	Identify discrepancies by circling incorrect information and writing in actual information.
9	Return the report to the library after completing the audit.

# Audit Report Example

While performing the audit, annotate this example of the helo shop audit report with the required information.

HUBE THE SAME TO STATE THE STA									ב ב	7 DE	Lava								
BASIC COPY   SAFETY   UNIT NAME: CGAS	LOS ANG	ELES					•		<u> </u>	5									
Marie   Mari	SHOP: HELO																		
R         910915         2         18         991207         3         4         991207         3         4         991207         3         4         991230         4         940620         3         2           1         \$60228         3         900930         7         7         3         931230         2           1         \$60528         3         930930         7         7         91230         7	PUB NO.	BASIC	COPY NO.	REV	DATE	CHANGE	DATE	RAC	DATE		DATE		DATE	SUP				DATE	COMMENTS
R         920101         2           901119         3         10         931123         1         940620         2           8         860228         3         900930         7         3         931230         2           8         860731         3         900930         7         8         3         931230         3           72-28-2         860201         2         4         900601         2         920314         3         93014           72-48-2         930415         2         4         900601         2         920115         3         930104           880930         2         5         921115         3         930104         3         930104	ACMS H65	910915	7			81	931207												
1       991123       1       940620       1       940620       2         2       860228       3       900930       3       900930       3       3       931230       3       931230         3       880731       3       9       930532       3       3       931230       3	ACMS MSR	920101	7																
800302         3         900930         3         901320         3         911230           800731         3         4         900501         3         3         911230           72-28-2         800701         2         930930         2         900601         2         920314         3           210000         880301         2         910210         3         921115         3	1H-65A-1	901119	6			10	931123					-	940620					931215	
860228         3         4         900501         3         931230           860731         3         1         930524         3         931230           72-28-2         860201         2         4         900601         2         3           72-48-2         930415         2         4         900601         3         3           810000         880301         2         910210         3         921115         3	1H-65A-2-1	870302	6			6	900930												
3       880731       3       1       930524       930524         72-28-2       860201       2       930930       2       920314         -72-48-2       930415       2       910210       2       910210         -210000       880301       2       921115       3	1H-65A-2-2	860228	60			4	900501								931230				
72-28-2     \$60201     2     4     900601     ,2     920314       72-48-2     930415     2     910210     2     910210       830930     2     5     921115     3	IH-65A-2-3	880731	3				930524												
11.72.2B-2       860201       2       4       900601       2       920314       3         11.72.4B-2       930415       2       910210       2       910210       3         11.210000       880301       2       2       921115       3	1H-65A-4	870601	e			~	930930												
11-72-4B-2 930415 2 2 910210 11-210000 880301 2 2 910210 850930 2 5 921115 3	1H-65A-11-72-2B-2	860201	7			4	900601					۲,	920314						
850930 2 5 910210 3 3	1H-65A-11-72-4B-2	930415	7														-		
850930 2 5 921115 3	1H-65A-11-210000	880301	7			2	910210												
	8D2-3-1	850930	7			ĸ	921115									930104			

# Publication Supplement Example

Use this Safety Supplement example to complete the practice exercise.

SS	SS SS SS SS SS SS SS SS T.O. 8D2-3-1 SS-3	SS
SS	TECHNICAL MANUAL SAFETY SUPPLEMENT	SS
SS	OPERATION SERVICE AND REPAIR AIRCRAFT NICKEL CADMIUM	SS
SS	STORAGE BATTERIES	SS
SS	THIS PUBLICATION SUPERCEDES T.O. 8D2-3-1SS-1 DATED 09 OCTOBER 1992, and supplements T.O. 8D2-3-1 DATED 30 SEPTEMBER 1985. Reference to this supplement will be made on the title page of the basic manual by personnel responsible for maintaining the publication in a current status.	SS
SS	<b>DISTRIBUTION STATEMENT B</b> - Distribution authorized to U.S. Government agencies only, for administrative or operational use <b>(04 JAN 1993)</b> . Other requests for this document shall be	
SS	referred to Sacramento ALC/TILBE, 3200 Peacekeeper Way, Suite 1 McCellian AFB, CA 95652.  COMMANDERS ARE RESPONSIBLE FOR BRINGING THIS SUPPLEMENT TO THE ATTENTION OF ALL AFFECTED PERSONNEL.	SS
SS		SS
ss	PURPOSE.  To update the basic manual.  04 Jan 1993	SS
SS	INSTRUCTIONS.     a. On page 4-11, paragraph 4-49 is added to read as follows.	SS
SS	4-49. HEATER BLANKET WIRING HARNESS: Two element heater blankets are to be wired in series with each other, and not in parallel.	SS
SS	WARNING  If wired in parallel, one element may overheat. This may cause internal shorting of cell(s) resulting in the failure of battery and cell case rupture.	SS
SS	THE END 1/ (2 Blank)	SS
SS	SS SS SAFETY SUPPLEMENT SS SS SS	SS

Title Page Example

Use this Title Page example to complete this practice exercise.

T.O. 8D2-3-1

**TECHNICAL MANUAL** 

**OPERATION, SERVICE AND REPAIR** 

# AIRCRAFT NICKEL CADMIUM STORAGE BATTERIES

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PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

**30 SEPTEMBER 1985** CHANGE 4 - 13 MAY 1992

# **List of Effective Pages Example**

Use this List of Effective Pages example to complete the practice exercise.

T.O. 8D2-3-1 INSERT LATEST CHANGED PAGES, DESTROY SUPERSEDED PAGES

LIST OF EFFECTIVE PAGES

		NOTE:	vertical line in the illustrations are inc	affected by the changes is indicated outer margins of the page. Changlicated by miniature pointing hand diagrams are indicated by shade	gesto is.
Dates of issue for o	original and cha	anged pages are:			
Original030 Change113 Change204 Change308 Change404	MAY 87 MAY 89 JUL 91				
Total number of page	ges in this publ	lication is 52 consisting	of the following	ng:	
Page	Change	Page	Change	Page	Change
No.	*No.	No.	*No.	No.	*No.
Title	4	4-3	2	7-3	1
A	4	4-4	4	7-4	1
i	2	4-4.1 Added	2		
i-v	3	4-4.2 Blank	2		
vi Blank	3	4-5	1		
1-1	3	4-6 - 4-7	3		
1-2 - 1-3	0	4-8 - 4-11	0		
1-4	3	4-12 Blank	0		
1-5	1	5-1	0		
1-6	0	5-2 - 5-3	1		
1-7	1	5-4	4		
1-8 - 1-9	0	5-5	1		
1-10	3	5-6	0		
2-1	4	5-7	2		
2-2 Blank	3	5-8	4		
3-1	4	6-1	0		
3-2	3	6-2 Blank	0		
4-1	3	7-1	3		
4-2	0	7-2	0		
		Zero in this column indicates an o	original page		
		· · · · · · · · · · · · · · · · · · ·			USAF

USAF

A Change 4

## Feedback

Your annotated Audit Report should be similar to the one shown below. The shaded areas highlight the entries you should have made. If you had troubles with this exercise, please review the appropriate section of this assignment.

							~	NODE	TRE	<b>AUDIT REPORT</b>	_								
UNIT NAME: CGAS LOS ANGELES SHOP: HELO	LOS ANG	SELES																	
PUB NO.	BASIC	COPY NO.	REV	DATE	CHANGE	DATE	RAC	DATE	DATE IRAC	DATE	TOPS	DATE	SUP	DATE	SAFETY	DATE	OP SUP	DATE	COMMENTS
ACMS H65	910915	7			18	931207													
ACMS MSR	920101	7																	
IH-65A-1	901119	3			01	931123					-	940620					2	931215	
tH-65A-2-1	870302	e			e	900930													
IH-65A-2-2	860228	ы			4	102006							٣	931230					
IH-65A-2-3	880731	ы			-	930524													
IH-65A-4	870601	3			<b>v</b> :	930930													
IH-65A-11-72-2B-2	860201	7			4	109006					7	920314							
IH-65A-11-72-4B-2	930415	2																-	
IH-65A-11-210000	880301	7			2	910210													
3D2-3-1	850930	2		v	Ches	920513	Λ								æ	930104			

Questions
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Answer the following questions on technical publications audits.

# Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate page of this reading assignment.

Questions	Answers	Reference
1.	Every four months	4
2.	<ul><li>a. Ensure publications contain the most current changes/updates.</li><li>b. Provides an opportunity to review your shop technical library requirements.</li></ul>	4
3.	five working days	10

5.A.03c Syllabus

### **Performance**

**AUDIT** technical publication directives.

# Performance Objective 1

Given a technical publications audit report, **VERIFY** the shop publications status compared to the audit report IAW the Technical Information Management and Ordering System, CGTO PG-85-00-50, and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

\_\_\_\_\_

# Performance Objective 2

Given a technical publications audit report, **ANNOTATE** (write)correction entries on the audit IAW the Technical Information Management and Ordering System, CGTO PG-85-00-50, and the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

## **Objectives**

To successfully complete this assignment, you must study the next and master the following objectives:

- **STATE** in writing the forms used for recommending a change to publications.
- **COMPLETE** a CG-22 form with the required information from a given scenario.
- **COMPLETE** an AF Form 847 with the required information from a given scenario.

### References

The information contained in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1
- Aeronautical Engineering Process Guide, (CG-22 Process), CGTO PG-85-00-20

5.A.04c Overview

### Introduction

In this reading assignment, you will learn how to fill out and submit the appropriate form used to propose changes to directives, ACMS, or technical publications.

As a Coast Guard Petty Officer and an aircraft technician you must rely upon many different publications to perform your duties. Keeping these publications up to date and as reliable as possible is everyone's responsibility. There will be times when you will read something you know is incorrect and affects the meaning of instructive information. These errors could be as simple as a typing error or as critical as a missing step on an ACMS card. When an error is encountered, **You** should attempt to get corrected. If you wait for the other person to submit a change form, the error may never be corrected.

# In This Assignment

In this assignment we will discuss the following topics:

Subject	Page
Publication Improvement Recommendation Forms	3
Completing the CG-22 Form	5
CG-22 Form Practice	10
CG-22 Form Feedback	12
Completing the AF Form 847	13
AF Form 847 Practice	16
AF Form 847 Feedback	18
Publication Improvement System Self-Quiz	19
Publication Improvement System Self-Quiz Feedback	20
Syllabus	21

Publication improvement recommendation forms are used to recommend changes, error corrections, updates or deletions to all publications and ACMS/MSR maintenance procedure cards in use by the Coast Guard.

## **Types of Forms**

The two types of forms discussed in the instructions and used to recommend changes to publication are as follows:

- CG-22, Aeronautical Publication Change Recommendation Form
- AF Form 847, Recommendation for Change of Publication (Flight and Standardization Manual)

5.A.04c Blank Page

The Aeronautical Publication Change Recommendation Form (CG-22) is used to recommend changes to correct errors which affect the meaning of instructive information or procedures contained in technical manuals or procedures contained in technical manuals or ACMS/MSR cards except aircraft flight manuals (-1 series).

# Availability of Forms

The CG-22 Form can be obtained from your shop supervisor or the Quality Assurance (QA) office. If you have access to a CG standard work station II, this form is available on the SAE Forms Plus Laser Library, or Jet Filler on standard work station III. If more room is needed than is available on the CG-22 Form, also obtain a CG-22 continuation sheet (see example on page 8).

### Operation

The technician/mechanic who originates a CG-22 form fills out a draft copy and submits it to the unit's QA office. The proposal is reviewed by QA personnel for validity and technical accuracy. They then make necessary corrections without changing the intended meaning of the original proposal. Using a CG standard work station, QA personnel transfer the information onto the computer version of the form and then print out what becomes known as the original. You, the originator, will be asked to review this original to ensure it still says what you intended to say.

### **Signatures**

Once the originator and QA are in agreement, the CG-22 Form is signed by the originator and the QA officer. It is then forwarded to the unit engineering Officer for local approval.

### **Control Number**

The control number enables tracking of individual CG-22's. After the Engineering Officer approves the CG-22, the ACMS Field Terminal Operator will enter the information into the ACMS CG-22 Tracking System. The ACMS then assigns a control number for the CG-22 which is handwritten on the form.

### Distribution

After the control number is entered on the CG-22, it is returned to QA for submission to the appropriate aircraft Prime Unit. Changes that are not specific to any aircraft type can be sent to any Prime Unit. Distribution is limited to the original CG-22 Form being submitted to Prime Unit.

# CG-22 Block Entry Table

The following table contains remarks for the blocks that should be completed prior to submitting the CG-22 Form to the Quality Assurance Office. Only the applicable blocks from block #1 through block # 24 should have an entry. See example on the following page.

Block #	Entry/Remarks
1	Insert unit OPFAC number
2	Insert unit name to identify the originating unit.
3	Insert the date (MM DD YY – i.e. 10 25 99).
4	Quality Assurance will insert the Control Number
5	Insert change title if applicable
6	Insert Originator name
7	Insert originator phone
8	Indicate the type of publication affected.
9	Enter aircraft type or equipment affected by this change.
10	Insert yes or no if change is procedural.
11	Insert yes or no if change affects a TCTO.
12	Insert the publication number.
13	Insert the revision date.
14	Insert the affected page(s)
15	Insert the ATA chapter
16	Insert the affected paragraph
17	Insert the affected figure (if applicable)
18	Insert the affected Commandant Change (if applicable)
19	Insert the affected MPC number (if applicable)
20	Insert the affected date of MPC (if applicable)
21	Insert the affected page of MPC (if applicable)
22	Insert the affected interval change (if applicable)
23	Describe the manual deficiency and recommend changes using clear and
	concise terms. Use a continuation sheet if necessary.
24	Describe the MPC deficiency and recommend changes using clear and concise
	terms. Use a continuation sheet if necessary. (if applicable)
25	Ensure QA receives and signs original copy of CG-22

# Example of a Completed CG-22

The following is an example of a CG-22 Form that was submitted by the Aviation Technical Training Center.

. OPFAC 78 - 61300	UNIT     ATTC, Elizabe	eth City NC	3. DATE INITIATED	25 / 99	4. CONTROL NUMBER 93 - 016 - R
. CHANGE TITLE		6. ORIGINATOR (F			7. ORIGINATOR PHONE
				VTC	(252)335-6856
CG-22 TYPE	9. AIRCRAFT TYPE		10. PROCEDURAL (Y/N)		11. TCTO (Y/N) NO
ub XX MPC Comb PUBLICATION NUMBER		HU-25	NO 13. REV. DATE		14. PAGE
	5A - 6WB			/ 04 / 84	8 / 146 / 147
. ATA CHAPTER	16. PARAGRAPH		17. FIGURE		18. COMDT. CHANGE (Y/N)
23 - 51 - 00		39a , 1e			
. MPC NUMBER	20. DATE		21. PAGE		22. INTERVAL CHANGE (Y/N)
RECOMMENDATION:  MPC DEFICIENCY:  RECOMMENDATION:					
		koor-sensi Nor-alasaksi valet, seni oleksi	26. ENGINEERING OFFICE	R OR DESIGNATED RE	PRESENTATIVE (Signature)
. PRIME UNIT REMARKS:	TAPP CANCEL	30. PRIORITY	31. TOPS (Y/N)	28. DATE OUT: 32. SIGNATURE	PRESENTATIVE (Signature)
LOCAL QA (Signature)  . PRIME UNIT REMARKS:  . ACTION CODE (A/P/D/X)  APP. PAR DIS . TECHNICAL SERVICES REMARKS	SAPP. CANCEL :	30. PRIORITY U/N/R		28. DATE OUT:	PRESENTATIVE (Signature)
. ACTION CODE (A/P/D/X)  APP. PAR DIS  . TECHNICAL SERVICES REMARKS	<ul> <li>1.12. Patentinature (1545) - 2.00 (4.00 (25.15) (15.00)</li> </ul>	U/N/R	31. TOPS (Y/N) Y / N	28. DATE OUT: 32. SIGNATURE  34. DATE OUT:	PRESENTATIVE (Signature)
ACTION CODE (A/P/D/X)  APP. PAR DIS  TECHNICAL SERVICES REMARKS		U/N/R  36. PRIORITY	31. TOPS (Y/N) Y/N 37. TOPS (Y/N)	28. DATE OUT: 32. SIGNATURE	PRESENTATIVE (Signature)
ACTION CODE (A/P/D/X)  APP. PAR DIS  TECHNICAL SERVICES REMARKS  ACTION CODE (A/P/D/X)  APP. PAR DIS	<ul> <li>1.12. Patentinature (1545) - 2.00 (4.00 (25.15) (15.00)</li> </ul>	U/N/R	31. TOPS (Y/N) Y / N	28. DATE OUT: 32. SIGNATURE  34. DATE OUT:	PRESENTATIVE (Signature)
PRIME UNIT REMARKS:  ACTION CODE (A/P/D/X)  APP. PAR DIS  TECHNICAL SERVICES REMARKS  ACTION CODE (A/P/D/X)  APP. PAR DIS  RCM SIGNATURE:		U/N/R  36. PRIORITY	31. TOPS (Y/N) Y/N  37. TOPS (Y/N) Y/N  40. G-EAE-2 SIGNATURE:	28. DATE OUT: 32. SIGNATURE  34. DATE OUT: 38. SIGNATURE	PRESENTATIVE (Signature)
ACTION CODE (A/P/D/X)  APP. PAR DIS  TECHNICAL SERVICES REMARKS  ACTION CODE (A/P/D/X)  APP. PAR DIS  RCM SIGNATURE: (Interval Changes Only)	: APP CANCEL	U/N/R  38. PRIORITY U/N/R	31. TOPS (Y/N)	28. DATE OUT: 32. SIGNATURE  34. DATE OUT: 38. SIGNATURE	
ACTION CODE (A/P/D/X) APP. PAR DIS TECHNICAL SERVICES REMARKS  ACTION CODE (A/P/D/X) APP. PAR DIS RCM SIGNATURE: (interval Changes Only) DATE OUT: 42. CODE	: APP CANCEL	U/N/R  38. PRIORITY U/N/R	31. TOPS (Y/N) Y/N  37. TOPS (Y/N) Y/N  40. G-EAE-2 SIGNATURE:	28. DATE OUT: 32. SIGNATURE  34. DATE OUT: 38. SIGNATURE	PRESENTATIVE (Signature)  46. PRIORITY  U/N/R
ACTION CODE (A/P/D/X) APP. PAR DIS TECHNICAL SERVICES REMARKS  ACTION CODE (A/P/D/X) APP. PAR DIS RCM SIGNATURE: (Interval Changes Only) DATE OUT: 42. CODE A / P	: APP CANCEL	U/N/R  36. PRIORITY U/N/R	31. TOPS (Y/N)	28. DATE OUT: 32. SIGNATURE  34. DATE OUT: 38. SIGNATURE  Only) 45. CODE	46. PRIORITY
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FORM 22 PREVIOUS EDITIONS OBSOLETE

## CG-22 Continuation Sheet

This form is provided to give the originator more space to identify the deficiency and to make recommendations. When a continuation sheet is used, enter the appropriate page number, in the top, right-handed corner of the form. In blocks 1 through 4, enter the same information that is on page number one (see page 6).

IICAL PU			KECOMINE		
2. OPFAC	3. CONTROL NUMBER	4. ATA CODE			
-					
		<u> </u>			
	MANUAL	-			
				(Use continuation	nages as necessary
	ACMS			,	,
		CONTINUATIO  2. OPFAC  3. CONTROL NUMBER	CONTINUATION SHEET  2. OPFAC  3. CONTROL NUMBER  4. ATA CODE  MANUAL	CONTINUATION SHEET  2. OPFAC  3. CONTROL NUMBER  4. ATA CODE  MANUAL	2. OPFAC  3. CONTROL NUMBER  4. ATA CODE  MANUAL  (Use continuation

Blank Page 5.A.04c

Now that you have seen how a CG-22 Form should be filled out, practice by completing the form on page 11 using the following scenario.

### Scenario

You are stationed at Coast Guard Air Station Clearwater, OPFAC # 07-20150. While reading about the operation of the T-56 engine in the Air Force T.O. 1C-130H-2-70GS-00-1, (Change 3, Date 12 Mar 96, paragraph 5-2.2 states that the engine low-speed operating range is between 9 and 30 degrees of throttle lever travel. However, paragraph 5-2.5, states that the low-speed operating range is between 9 and 40 degrees of throttle lever travel. To determine which statement is correct you look up the information in the CGTO 1C-130-1 Flight Manual. On page 1-37 and 1-38 the "Low-Speed Ground Idle Control" paragraph states that the operating range is between 9 and 30 degrees of throttle lever travel.

# **CG-22 Practice** Form

Complete the form below using the information in the practice scenario given on the previous page.

AERONAUTICAL PUBLICATION CHANGE RECOMMENDATION							
1. OPFAC	2. U	NIT		3. DATE INITIATED		4. CONTROL NUMBER	
5. CHANGE TITLE			6. ORIGINATOR (Fire	t, MI, Last, Rank)		7. ORIGINATOR PHONE	
8. CG-22 TYPE Pub MPC	9. A	IRCRAFT TYPE		10. PROCEDURAL (Y/N)		11. TCTO (Y/N)	
12. PUBLICATION NUMBER				13. REV. DATE		14. PAGE	
15. ATA CHAPTER	16.	16. PARAGRAPH		17. FIGURE		18. COMDT. CHANGE (Y/N)	
19. MPC NUMBER	20.	DATE		21. PAGE		22. INTERVAL CHANGE (Y/N)	
23. PUBLICATION DEFICI	ENCY:				I		
RECOMMENDATION:							
24. MPC DEFICIENCY:							
RECOMMENDATION:							
25. LOCAL QA (Signature)				26. ENGINEERING OFFICE	R OR DESIGNATED RE	PRESENTATIVE (Signature)	
27. PRIME UNIT REMARK		- CHARLEST AND RESIDENCE AND SE	THE PARTY OF THE PARTY AND THE PARTY OF THE		The Mary Program of the Control of t	en Anderson de altre de la reconstruir de la reconstruir de la reconstruir de la reconstruir de la reconstruir	
27. PRIME ONLI REMARK	<b>5.</b>						
29. ACTION CODE (A/P/D	W)		aa BRIARITY	31. TOPS (Y/N)	28. DATE OUT: 32. SIGNATURE		
APP PAR.	DISAPP	CANCEL	30. PRIORITY U/N/R	Y/N	32. SIGNATURE		
33. TECHNICAL SERVICE:	S REMARKS:	iki Saluman masaki (1918, 1915-1916) (1926, 1937) (1936)	1358 GB 960 400 200 000 600 600 600 600 600 500 500		SCAN AND MILES ## 6.75-02-3442.2747-4883.		
					34. DATE OUT:		
35. ACTION CODE (A/P/D	/X)		36. PRIORITY	37. TOPS (Y/N)	38. SIGNATURE		
APP PAR.	DISAPP	CANCEL	U/N/R	Y / N	-brokenski, ki iz 1884. u Sportski i Poprada 1981. u brit	on the control that the property of the control of	
39. RCM SIGNATURE: (Interval Changes Only)			40. G-EAE-2 SIGNATURE: (COMDTINST Changes Only)				
41. DATE OUT:	42. CODE A/P/D/X	43. PRIORITY U/	N/R	44. DATE OUT:	45. CODE A/P/D/X	46. PRIORITY U/N/R	
47. TPS MANAGER Signature	le Carrier (i Aleman) i Aleman de Cantinador menor de la Calle II especial.	7 tra service au ana an matamien ann salass De	ate:	48. TPS FINAL: Signature	ong Na Sampi na dikabelikan paganan sa sasa sa	Date:	
49. MPC COTR: Signature		D	ate:	50. MPC FINAL: Signature	en en en en en en en en en en en en en e	Date:	
Signature Date:  Remarks:				Remarks:			
			CG FC	RM 22		PREVIOUS EDITIONS OBSOLETE	

# **Feedback**

Your CG-22 Form should be completed as shown below. If there are errors, please review the scenario and pages 6 and 7 to correct any errors found.

AERONAUTICAL PUBLICATION CHANGE RECOMMENDATION							
1. OPFAC		2. UNIT		3. DATE INITIATED		4. CONTROL NUMBER	
07 - 2015	0 CGA	S Clearwa			27/99	. ORIGINATOR PHONE	
5. CHANGE TITLE 6. ORIGINATOR (First, MI, Last, R. Your Name				i, Wii, Last, Nanky	l'	( )	
8. CG-22 TYPE	9. All	RCRAFT TYPE	1001	10. PROCEDURAL (Y/N)	1	1. TCTO (Y/N)	
Pub X MPC	Comb	H	C - 130	Yes		No	
12. PUBLICATION NUMBE				13. REV. DATE	2 / 96	4. PAGE 5-5	
1C-130H-2-70GS-00-1  15. ATA CHAPTER			17. FIGURE		8. COMDT. CHANGE (Y/N)		
76	<b>I</b>	5-2.5			No		
19. MPC NUMBER		20. DATE		21. PAGE	2	2. INTERVAL CHANGE (Y/N)	
On page 5-5, paragraph 5-2.5 states that the engine low-speed ground idle switch is closed when the throttle is between 9 and 40 degrees of throttle lever travel (read on the coordinator). The C-130 Flight Manual, pages 1-37 & 1-38 state the Low-Speed ground Idle Control range is between 9 and 30 degrees.  RECOMMENDATION:  Change paragraph 5-2.5 to read, "The Low-Speed ground idle switch is closed when the throttle is between 9 and 30 degrees of throttle lever travel (read on the coordinator).  24. MPC DEFICIENCY:  RECOMMENDATION:							
25. LOCAL QA (Signature)				26. ENGINEERING OFFIC	ER OR DESIGNATED REF	PRESENTATIVE (Signature)	
SAME CONTRACTOR SAME OF THE SA		o portuntarily against one fine Calabata	station to the training of the Feldows and Consequence	The state of the second	en en en en en en en en en en en en en e	e saan soona a saaraa dagaa saacaa ahaa ahaa ahaa ahaa ahaa ahaa	
27. PRIME UNIT REMARKS			30. PRIORITY	31. TOPS (Y/N)	28. DATE OUT:		
APP PAR.	DISAPP.	CANCEL	U/N/R	Y/N	oz. didiwirdia		
33. TECHNICAL SERVICES	S REMARKS:				34. DATE OUT:	n um min makenger per a 1966-bil 42 utilina 1933, <i>1977</i> timberatus bilakenda	
35. ACTION CODE (A/P/D/		2411051	36. PRIORITY	37. TOPS (Y/N)	38. SIGNATURE		
APP. PAR.	DISAPP.	CANCEL	U/N/R	Y / N  40. G-EAE-2 SIGNATURE	:		
(Interval Changes Only) 41. DATE OUT:	42. CODE	43. PRIORITY	/N/R	(COMDTINST Change 44. DATE OUT:	45. CODE A / P / D / X	46. PRIORITY U/N/R	
47. TPS MANAGER Signature	A/P/D/X	titi	Oate:	48. TPS FINAL: Signature	I AIFIDIA	Date:	
49. MPC COTR: Signature	o y bashqira — mastar, qoshira e	المهاورة الاستنارات كالما الأوارية المادي والإيرانية	Date:	50. MPC FINAL: Signature	este de companya de la companya de la companya de la companya de la companya de la companya de la companya de	Date:	
Remarks:				Remarks:			
Nomana.				DM 22		PREVIOUS EDITIONS OBSOLETE	

#### Introduction

The Recommendation for Change of Publication (AF Form 847) is used to correct errors which affect the meaning of instructive information of procedures in all Coast Guard aircraft flight manuals (-1 series).

### Availability of Form

The AF Form 847 can be obtained from your shop supervisor or the Quality Assurance (QA) office. If you have access to a Coast Guard standard work station, this form is available on the SAE Forms Plus Laser Library or on the Jet Form Filler on standard work station III.

#### **Process**

The aircrew member/mechanic who originates an AF Form 847 fills out a draft copy and submits it to the unit's QA office. The proposal is reviewed by QA personal for validity and technical accuracy. They then make necessary correction without changing the intended meaning of the original proposal. Using a CG standard work station, QA personnel transfer the information onto the computer version of the form and print out what becomes known as the original. You, the originator, will be asked to review this original to ensure it still says what you intended it to say.

#### Signatures

Once the originator and QA are in agreement, the AF Form 847 is signed by the originator and the QA Officer. It is then forwarded to the unit Engineering Officer for local approval.

#### **Distribution**

After the Engineering Officer approves the AF Form 847, it is returned to QA for submission to appropriate aircraft Prime Unit, Commandant (G-SAE), Commandant (OCA), and appropriate aircraft Standardization Unit. For distribution details refer to Aeronautical Engineering Maintenance Management Manual COMDINST M13020.1 (series)

### **Completing the AF Form 847(Continued)**

### AF Form 847 Block Entry Table

The following table contains remarks for the blocks that are required to be completed prior to submitting the AF Form 847 to the Quality Assurance Office. See example on the next page.

Block # Entry/Remarks Date Enter the date which you are submitting this form. Unit Enter you units OPFAC Number. Number 1 Enter the Publication Number. 2 Enter the T.O.'s Basic Date. Located on the cover page. Enter the Revision/Change Date, located on the cover page. 3 4 Enter the affected Page Number you want changed. 5 Enter the Major Paragraph Title in this block, it will be in bold black lettering. Enter the Sub-Paragraph Title in this block if one applies. 6 7 Enter the Item Number in this block. 8 Enter whether you want to change or delete a paragraph, item or figure. State how it presently reads, and how you want it to read. 9 Enter whether you wish to change or to delete a paragraph, item or figure. State how you want it to read. Enter whether you are adding a new Paragraph, Sentence, Item or Figure. State how you 10 want it to read. This block is used in conjunction with block 9. Enter vou reason for recommending a Change, Addition or Deletion. State any adverse 11 operational effects that your change will correct if instituted. Organ-Enter your units name and address. ization Name, Grade and Signature Self-explanatory

Example of a Completed AF Form 847

The Following is a example of a completed AF Form 847 that was submitted by Aviation Technical Training Center.

Recommendation For Change Of F	Date	Unit Number			
(Flight Publications)	17 May 1995	78-61300			
C.G.T.O. 1C-130-1 1 January 1992	ision/Change Date (3) None	(Reserve	d)		
Page Number (4) Major Paragraph Title (5)	C Power Distribution				
Sub-Paragraph Title (6) LH AC Bus, Pilot's Upper (	Circuit Breaker Panels	Item Nu	mber (7)		
(8) Change Delete so much of	Paragraph I	tem X Fi	gure		
As Reads Figure 1A-49 shows circuit breakers for the windshiel To Read	d washer system.				
Delete the reference to the windshield washer circuit l	oreakers.				
After Present (9) Sentence	Item				
	To-1s.				
	entence	Item	Figure		
To Read					
Reason For Recommended Change, Addition or Delet	ion (Include Adverse	Operational Et	fects) (11)		
CGTCTO HC130-930001 directs units with 1500 series C-130s to remove the windshield washer system. Therefore the reference to these circuit breakers needs to be eliminated.					
Organization Aircraft Repair and Supply Center, Elizabeth City NC. 27909					
Type Name and Grade of Originator Stan Lane AVTC Signature Your Signature					

#### Introduction

Now that you have seen how an AF Form 847 is filled out, practice by completing the form on page 17 using the following scenario.

#### Scenario

You are stationed at Coast Guard Air Station Sacramento OPFAC #11-20290. You are reading the Omega Navigation System paragraph in CGTO 1C-130-1 flight manual. In the Search Mode Operation subparagraph on page 1-474, you notice that item #11 reads as follows:

FIRST TURN DIRECTION-ENTERED Press L for left turn or R for right turn.

Having just graduated from Basic Air Navigation School, you know the L or R for left or right turns cannot be entered without first pressing the R push button to blank out the right display, therefore the search cannot be used.

Your recommendation is to change item 11 to read as follows:

FIRST TURN DIRECTION-ENTERED
Press the R push button to blank the right display, then press the R push button for right turn or L push button for left turn.

The basic date of CGTO 1C-130-1 is 6 November 1986.

AF Form 847 Practice Form Complete the form below using the information in the practice scenario on the previous page.

Recommendation For Change Of Publication				Unit Number		
(Flight Publications)						
Publication Number (1)	rublication Number (1) Basic Date (2) Revision/Change Date (3) (Reserved)					
Page Number (4)	Major Paragraph Title	(5)		-		
Sub-Paragraph Title (6)				Item Number (7)		
(8)	Delete so much of	Paragraph	Item	Figure		
As Reads						
To Read						
	•		•			
After Present (9)	Sente	nce Item	•			
As Reads						
·	- //					
	Paragraph [	Sentence	Item	Figure		
To Read						
Reason For Recommended	l Change, Addition or l	Deletion (Include Adv	erse Opera	ttional Effects) (11)		
Organization						
Type Name and Grade of G	Originator	Signature				

### **Feedback**

Your AF Form 847 should be completed as shown below. If there are errors, review the scenario and pages 14 & 15. Correct any errors found.

Recommendation For Change Of Publication			Date Todays Unit Number		
	(Flight Publication	Date 20290			
Publication Number (1) CGTO 1C-130-1	Basic Date (2) 6 Nov. 1986	Revision/Change Date (2	(Reserved)		
Page Number (4) 1-474	Major Paragraph Title	e (5) Omega Navigation S	vstem (LTN-211)		
Sub-Paragraph Title (6)	Canal Mada On serie		Item Number (7)		
	Search Mode Operatio	<u> </u>			
(8) X Change	Delete so much of	Paragraph	Item Figure		
As Reads					
FIRST TURN DIRECTIO		50.11			
Using Push button, pr	ess L for left turn	or R for right turn.			
To Read					
	NI ENTERED				
FIRST TURN DIRECTIC			1 70.1		
	on to blank the righ	it display, then press i	he R button for right turn		
or L for left turn.			•		
After Present (9)	Sente	ence Item			
As Reads	**************************************				
Add New (10)	Paragraph [	Sentence	Item Figure		
To Read		· · · · · · · · · · · · · · · · · · ·			
Reason For Recommended	Change, Addition or	Deletion (Include Adverse	Operational Effects) (11)		
L or R for left or right turn	cannot be entered wit	hout first pressing the R r	ush button to blank the right		
display, therefore the search	L or R for left or right turn cannot be entered without first pressing the R push button to blank the right display, therefore the search cannot be used.				
1 ,,					
Organization					
Coast Guard Air Station Sa	acramento				
Type Name and Grade of C	Driginator Triginator	Signature			
Your Name and Rate	<del>-</del>	Your Signature			

_				
(1	IΙΔ	sti	$\sim$	nc
w	uc	ЭLI	u	

Answer the following question on the publication improvement system.

- 1. Which form would be used to request a change to an ACMS Maintenance Procedure Card?
- 2. Which form would be used to request a change to a Flight Manual?

### 5.A.04c Publication Improvement System Self-Quiz Feedback

### Feedback

Compare you answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate page of this reading assignment.

Question	Answers	Reference
1.	CG-22	5
2.	AF Form 847	13

Syllabus 5.A.04c

#### **Performance**

Submit a publication change request.

# Performance Objective 1

Given a blank CG-22 form and a maintenance publication or a ACMS/MSR car containing incorrect information, **COMPLETE** the CG-22 form with the required information IAW the Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series), and the CG-22 Process Guide, CGTO PG-85-00-20.

# Performance Objective 2

Given a blank AF Form 847 and a flight manual containing incorrect information, **COMPLETE** the form with the required information IAW the Aeronautical Engineering Maintenance Management Manual, COMDINST M13020.1 (series).

Ø

5.A.04c Blank Page

#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **SELECT** the correct manual used by the Coast Guard for the JOAP.
- **STATE** the purpose the JOAP.
- **STATE** the meaning of the term Spectrometric Oil Analysis.
- **DEFINE** the term Wear Metal.
- **STATE** the purpose of routine JOAP sample.
- **STATE** the purpose of special JOAP sample.
- **STATE** the warning associated with JOAP sampling methods.
- **STATE** the guidelines for taking JOAP samples.
- **IDENTIFY** the proper form for a DOD sponsored JOAP sample.
- **IDENTIFY** the manual used to fill out the DD Form 2026.
- **IDENTIFY** the proper form for the HU-25 SOAP sample.

#### References

The information in this assignment can be found in the following manuals.

- Joint Oil Analysis Program, NAVAIR 17-15-50.1
- Light Engine Maintenance Manual, 2J-ATF3-2-1
- Aeronautical Engineering Maintenance Management Manual, M13020.1 (series)

5.A.01 Overview

#### Introduction

The purpose of this assignment is to introduce you to the Joint Oil Analysis Program (JOAP). This assignment will also give you a basic understanding of the sample taking methods and the paperwork associated with the programs in Coast Guard aviation.

# In This Assignment

#### **Purpose of JOAP**

The purpose of the Joint Oil Analysis Program (JOAP) is to combine and maintain a standard program that consolidates and coordinates the military force's oil analysis programs under one controlling regulation. This program allows all military units to share the laboratories closest to their command.

### NAVAIR 17-15-50 (series)

The NAVAIR 17-15-50 (series) Joint Oil Analysis Program manuals are the primary directives used by the Coast Guard for involvement in the JOAP. These manuals tell the technician how to draw the sample and fill out the paper work associated with DOD sponsored aircraft.

# Spectrometric Oil Analysis

Spectrometric Oil Analysis is the term use for the actual test used in determining the amounts of wear metal in lubricating fluids. Under this program aircraft engines, main gearboxes and hydraulic fluids are the types of equipment monitored. If the wear metal concentrations exceed the normal wear limits, the component can be removed or repaired before a major failure of the component occurs.

#### **Wear Metals**

Wear metals are particles of metals that are suspended in the lubricating fluid. These particles are caused by friction between two moving parts. Despite proper lubrication in an aircraft system wear continues as a normal mechanical process. Any fluctuations of the wear metal concentrations in the JOAP sample is a concern and should be investigated by the technician. The appropriate ACMS MPC or aircraft publications should be referenced for further decisive action.

# Coast Guard Policy

The Joint Oil Analysis Program policy is that all Coast Guard aviation units must participate in the Joint Oil Analysis Program.

#### NOTE

History of the oil analysis program has clearly shown that the attitude of an operating activity towards the program is usually the decisive factor in its success.

#### **Routine JOAP**

A routine JOAP sample is a scheduled maintenance function that is tracked on the ACMS Maintenance Due List (MDL). The sample is done at a certain interval at a prescribed time decided by the component's manufacturer and/or the Coast Guard. The purpose of these routine samples is to continually monitor the condition of a component by averaging its wear rate and projecting the failure point. This allows the component to be removed prior to failing. It is important that the sample be drawn at the scheduled due time and sent to the lab in a timely manner.

# Special JOAP Samples

The purpose of a special JOAP sample is to test the system oil after an incident or a condition that requires sampling out of the component's normally scheduled JOAP cycle. Some well known incidents and conditions are as follows.

- Engine or main gearbox overspeed
- Chip detector indication
- Magnetic drain plug accumulation
- Troubleshooting a component
- Excessive vibration
- Re-test request from the JOAP lab
- ACMS MPC requirements

# Label For Special JOAP Samples

Special JOAP samples must be labeled to draw attention to the lab technician upon arrival. To do this you must color the JOAP sample bottle cap red, either by painting the cap or using a marking pen. This alerts the lab technician to process the sample immediately.

### JOAP Sampling Methods

There are three methods for taking JOAP samples.

#### WARNING

Do not use mouth suction to fill a sampling tube. Many fluids are highly toxic and may cause paralysis and/or death.

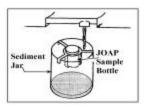
#### **Dip Method**

This method allows the technician to take the sample through the opening of the fluid reservoir by the use of a plastic tube. The oil is then transferred from the tube to the bottle.



### Drain/Valve Method

This method allows the technician to attach a line to the reservoir and drain the oil into the sample bottle. When using this method you must allow the oil to drain for a specified amount of time (check ACMS MPC) into the sediment jar to ensure that the drain is clean of any entrapped dirt or moisture prior to placing the oil into a clean sample bottle.



# Pump/Syringe Method

This method uses the suction of either a specially designed draw pump or a simple medical style syringe. The tubing is placed inside the filler neck or dip stick hole and suction is used to draw out the fluid. The fluid is then placed into a clean sample bottle. The syringe and tube are only to be used once and then discarded.

# Reliable JOAP Sample

A reliable JOAP sample is one which is truly representative of the circulating fluid in the equipment being evaluated.

#### **Guidelines**

To take a proper JOAP sample you should follow some of the basic guidelines listed below:

- Take IAW the MPC for the applicable aircraft and/or system being tested.
- Use only clean test equipment.
- Use only bottles that are clean and sealed.
- Use lint free rags only.
- Ensure that the systems are at normal operating temperature.
- Fill the bottle to within ½ inch from the top.
- Use the sampling tubes/syringes only once (to prevent cross contamination).
- If something is dropped into the system, *do not* operate the system until the foreign object is removed.
- Close the system access after sampling to avoid contamination.
- Label bottles as soon as possible to avoid sample misidentification.
- Process forms in a timely manner.

#### Introduction

During the JOAP sample testing process, the technician should consider the following factors which affect the results of a JOAP sample analysis.

#### **Normal Wear**

Wear metal concentrations will gradually increase, the longer a piece of equipment stays in service.

#### Contamination

This is one of the most frequent problems reported by the test labs and is considered the weak link in the sampling process. This is cause by using dirty:

- Bottles
- Caps
- Tubes
- Syringes
- Rags

#### **Break-in Period**

The break-in period for newly installed or rebuilt components will have a higher concentration of wear metals. Caused by:

- New parts meshing with the old parts
- Machining irregularities
- Dirt from opening and closing the component's casings

#### **Addition of Oil**

Adding oil to the lubrication system can compromise the integrity of the sample if the information is not passed onto the lab. This can cause the PPM (parts per million) of wear metal concentrations to be lower than they actually are.

## Sample Bottle Labeling

Each sample bottle must have a self-adhesive label which is normally manufactured locally. This label must contain the information shown on the example below.

### **Example**

This is an example of a typical JOAP bottle self-adhesive label.

Aircraft #	Aircraft	Hours	-
MGB Cold	#1 Eng	#2 Eng	Hot

#### **DD Form 2026**

The DD Form 2026 Oil Analysis Request is used for all DOD sponsored aircraft. This form communicates to the JOAP lab all the pertinent information needed to accurately evaluate the sample. The instructions on how to fill out the DD Form 2026 is in the NAVAIR 17-15-50.1, Joint Oil Analysis Program manual.

#### **HU-25 SOAP**

The HU-25's ATF-3-6 engines use a SOAP (Spectrometric Oil Analysis Program) form. This form is provided by the manufacturer as part of the oil sample kit. This form is filled out IAW the instructions on the back of the SOAP form.

Example of a Completed DD Form 2026 JOAP Form This is an example of a completed DD Form 2026 JOAP form on a HH-65A.

OIL ANALYSIS REQUEST	KEYPUNCH CODE			
TO OIL ANALYSIS LABORATORY JOAP REAL HALBOR	1-3			
MAJOR COMMAND CGAS BARBERS POUT	4			
OPERATING ACTIVITY (Include ZIP Code   APO   DODA AD)  BARBERS POINT, HT, 96862	5-10			
EQUIPMENT MODEL/APPLICATION MGB	11-14			
EQUIPMENT SERIAL NUMBER AGC- 123	15-20			
END ITEM MODEL/HULL NUMBER  HH 65A				
END ITEM SERIAL NUMBER/END ITEM CODE				
DATE SAMPLE TAKEN (Day, Mo., Yr) LOCAL TIME SAMPLE 79977 TAKEN /235	21-24			
HOURS/MILES SINCE OVERHAUL 400	25-29			
HOURS/MILES SINCE OIL CHANGE	30-33			
REASON FOR SAMPLE TEST TOTHER  ROUTINE REQUEST CELL (Specify)	34			
OIL ADDED SINCE LAST SAMPLE (Pts, Qts, Gals)	35-36			
ACTION TAKEN				
DISCREPANT ITEM				
HOW MALFUNCTIONED				
HOW FOUND				
HOW TAKEN SAMPLE TEMPERATURE TYPE OIL	37-38			
BASELINE REQUEST				
FOR LABORATORY USE ONLY				
SAMPLE RESPONSE TIME	39-40			
FE 41-43 AG 44-46 AL 47-49 CR 50-52 CU 53-55 MG 56-58	NI 59-61			
PB 62-64 SI 65-67 SN 68-70 TI 71-73 MO 74-76				
LAB RECOMMENDATION	77-78			
SAMPLE NO. SIGNATURE FILE MAINT 79	DATA SEQ 80			

DD FORM 2026 PREVIOUS EDITION WILL BE USED.

Example of HU-25 SOAP Form

Below is an example of a completed HU-25 SOAP form.



SOAP	0.0		NUMBER F		RED ER ANALYSIS PROGRA
Date Received	OIL	OIL SAMPLE SHIPPING FORM			IMPORTANT
	TPE331	TSE331	TFE731 A		TYPE OR PRINT CLEARL
ENGINE S/N	21151 ATF3-6-	yc	AIRCRAF	TYPI S/N	Z/15
Engine Hours On This Fills Engine Hours Since Last S Amount Of Oil Added Since Engine Hours Since Last O Oil Now In Use - Brand Did AlliedSignal Recomme Has There Been An Engine Describe Any Work Accom-	ar 200 sample Taken e Last Oil Chang complete Oil Cha mo A.J. and This Specific e Failure Or Ope plished On Oil V	200 ge	Sample  2  #00  Type  Type \( \sum \) No  lems Prior To To	his Sam	s Sampling
COMPANY CAAS STREET COTY OPA LOCK COUNTRY USA ATTENTION ATTE TELEPHONE TELEX OR FAX NUMBER NOTES: 1, DO NOT	A 3- Shaf	INE SERIAL I	NUMBER (S/N)	ZII	P CODE 33054

SQAP Instructions On Back

0	ПΩ	eti	in	ns	
w	116		IL J	115	

Answer the following questions on the Joint Oil Analysis Program.

1.	What manual is used by the Coast Guard as its primary directive for its involvement in the JOAP?
2.	State the purpose of the Joint Oil Analysis Program.
3.	Define the term Spectrometric Oil Analysis.
4.	Describe the term Wear Metal.
5.	What is the purpose of a routine JOAP sample?

Questions (continued)	6.	State the purpose of a special JOAP sample.
	7.	State the warning associated with taking a JOAP sample.
	8.	State the guidelines for taking a JOAP sample.
		a b c d
		e f g
		hi
		j k

# Questions (continued)

9. Match the form or manual in column A with its purpose in column B. Use each letter only once.

	Column A		Column B
1.	Allied Signal SOAP Form	a.	Instruction on how to fill out the DOD JOAP form
2.	NAVAIR 17-15-50.1	b.	The form used to communicate with the JOAP lab
3.	DD-Form 2026	c.	Form used for the ATF3-6 SOAP sample
		d.	ARSC Form ATF36/SOAP

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### **Feedback**

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answers	Reference
1.	NAVAIR 17-15-50 (series) Joint Oil Analysis Program	3
2.	Is to combine and maintain a standard program that consolidates and, coordinates the military forces oil analysis programs under one controlling regulation.	3
3.	The actual test used in determining the amount of wear metals in lubricating fluid.	3
4.	Particles of metals suspended in the lubrication fluid.	3
5.	Is a scheduled maintenance function that is tracked on the ACMS Maintenance Due List (MDL).	4
6.	The purpose of a special JOAP sample is to test the system oil after an incident or a condition that requires sampling out of the component's normal scheduled JOAP cycle.	4
7.	Do not use mouth suction to fill a sampling tube. Many fluids are highly toxic and may cause paralysis and/or death.	5

# Feedback (continued)

This is a continuation of the feedback table on the preceding page.

Question	Answer	Reference
8.	a. Take IAW the MPC's for the applicable aircraft and/or system being tested.	7
	b. Use only clean test equipment.	
	c. Only use bottles that are clean and that were sealed.	
	d. Use lint free rags only	
	e. Ensure that the systems are at normal operating temperature.	
	f. Fill the bottle to within ½ inch from the top.	
	g. Use the sampling tubes/syringes only once (to prevent cross contamination).	
	h. If something is dropped into the system, <i>do not</i> operate the system until the foreign object is removed.	
	i. Close the system access after sampling to avoid contamination.	
	<ul> <li>j. Label bottle as soon as possible to avoid sample misidentification.</li> </ul>	
	k. Process forms in a timely manner.	
9.	1. c 2. a 3. b	9

5.A.01 Blank Page

Performance

PREPARE the required oil analysis request form for an oil sample.

Performance
Objective 1

Given a DD Form 2026, applicable aircraft data, and a
NAVAIR 17-15-50.1 Joint Oil Analysis Program manual,
PREPARE the DD Form 2026 IAW the NAVAIR 17-15-50.1.

# Performance Objective 2

Given an Allied Signal SOAP form, applicable aircraft data, and the instructions on the back of the SOAP form, **PREPARE** the Allied Signal SOAP form IAW the instructions on the back of the form.

5.A.01 Blank Page

#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- ? **DEFINE** the term inspection.
- ? **STATE** the purpose of aircraft inspections.
- ? **STATE** the two categories of aircraft inspections.
- ? **STATE** the manual that contains specific inspection requirements for each aircraft type.
- ? **DEFINE** the term routine inspection.
- ? **IDENTIFY** routine and special inspections.
- ? **STATE** the form used to schedule special inspections.

#### References

The information contained in this assignment can be found in the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).

5.B.01c Overview

### Introduction

This assignment introduces you to the different types of inspections performed on Coast Guard aircraft.

### In This Assignment

In this assignment we will discuss the following topics:

Subject	Page
Introduction to Aircraft Inspections	3
Routine Inspections	4
Preflight Inspection.	5
Thruflight Inspection	6
Postflight Inspection	7
Hourly/Weekly Inspection	8
ACMS Scheduled Inspections	9
Special Inspections	10
Documenting Special Inspections	13
Aircraft Inspections Self-Quiz	17
Aircraft Inspections Self-Quiz Feedback	20
Syllabus	21

#### Introduction

The Coast Guard's Aviation Computerized Maintenance System (ACMS) includes all applicable inspection requirements for aircraft, ground support equipment, and special equipment. These inspections or tasks are completed and accounted for on an individual basis. This allows operational and maintenance flexibility with optimum use of staff-hours.

# **Definition of Inspections**

Inspections, varying in scope, purpose, and frequency, are periodic or on-condition maintenance checks performed on assigned aircraft.

### Purpose of Inspections

These inspections ensure that the aircraft are maintained in a safe, serviceable condition.

# Inspection Categories

Inspections performed on US Coast Guard aircraft are grouped into the following categories:

- Routine
- Special

### Inspection Criteria

For specific inspection requirements for each aircraft type, refer to the Aeronautical Engineering Maintenance Management manual, COMDTINST M13020.1 (series).

### **Definition**

Routine inspections are maintenance checks that are accomplished on a regular or scheduled basis.

### Inspections Considered to be Routine

The following inspections are considered to be of a routine nature:

- Preflight
- Thruflight
- Postflight
- Hourly/Weekly
- ACMS Maintenance Due List (MDL)

### Purpose of a Preflight Inspection

The preflight inspection consists of checking the aircraft for flight preparedness by performing visual examinations and operational tests to discover defects and mal-adjustments which, if not corrected, could adversely affect safety of flight or mission accomplishment.

### Preflight Inspection Characteristics

The Preflight Inspection consists of the following characteristics:

- Accomplished prior to the first flight of the day
- Remains effective for 24 hours provided no subsequent maintenance has been performed

# Purpose of a Thruflight Inspection

The Thruflight Inspection is accomplished as a turn-around inspection on selected types of aircraft listed in the Aeronautical Engineering Maintenance Management manual, COMDTINST M13020.1 (series).

# Thruflight Inspection Characteristics

The Thruflight Inspection consists of the following characteristics:

- Accomplished prior to take off on the second and each subsequent flight of the day
- Completion of a thruflight satisfies the requirements of a preflight. Therefore preflight certification can be documented on the CG-4377 Part I upon completion.

# Purpose of a Postflight Inspection

The purpose of a postflight inspection is to ensure that the aircraft is suitable for continued flight.

### Characteristics of a Postflight

- A postflight inspection consists of the following characteristics:
- Accomplished after the last flight of the flying period
- A visual inspection of certain components, systems, or areas, to ensure that no defects exist which would be detrimental to further flight
- Discloses defects requiring correction before deterioration into major maintenance items
- Inspection frequency ranges from once a day to once per week depending on the type of aircraft
- Performed on selected types of aircraft listed in the Aeronautical Engineering Maintenance Management manual, COMDTINST M13020.1 (series).

# Purpose of an Hourly/Weekly Inspection

These inspections are designed to provide servicing and verification of satisfactory functioning of critical systems/components at frequent intervals.

# Characteristics of an Hourly/Weekly Inspection

An Hourly/Weekly inspection consists of the following characteristics:

- Frequency of these types of inspections prohibits the use of the computer for scheduling
- Procedures for performing these inspections are located in the ACMS Maintenance Procedure Cards

#### Purpose of ACMS Scheduled Inspections

These inspections ensure that a thorough examination of all aircraft systems and components is accomplished on a scheduled basis.

#### Types of ACMS Scheduled Inspections

These inspections consist of the following types:

- Operations
- Calendar
- Hourly
- Cycles
- Landings

# Characteristics of ACMS Scheduled Inspections

These inspections consist of the following characteristics:

- Procedures for performing these inspections are located in the ACMS Maintenance Procedure Cards
- Appear on the ACMS Maintenance Due List (MDL) for action

#### Definition

Special inspections are certain additional inspections, distinct in frequency from routine inspections, which are conditional upon operational environment, specific incidents, or other circumstances requiring inspections.

# Examples of Special Inspections

The number of special inspections required for all aircraft and circumstances are too numerous to list. A few examples are given in the following items to illustrate their distinction from routine:

#### Overtemperature, Overspeed, Overtorque, Metal Contamination, Hard Landing, Lightning Strike Inspections,

(etc): These types of special inspections define the specific maintenance actions taken based upon the circumstances of the event. Procedures for performing these types of inspections have been written into existing manuals and the Aviation Computerized Maintenance System as the result of actual experiences or a high probability that the event will happen.

Time Compliance Technical Order (TCTO)/Message Time
Compliance Technical Order (Message TCTO): A TCTO is
normally generated by a reported safety-of-flight incident or failure
trend and is issued to perform inspections of an aircraft component or
system. TCTO's will appear on the ACMS Maintenance Due List
(MDL) report for action. A TCTO provides detailed information on
how to perform the inspection.

# Aircraft Damage Sustained as a Result of a Mishap: The commanding officer will ensure that all damage sustained is properly inspected by competent maintenance personnel and that the complete extent of the damage is reported. This inspection should not be limited solely to the damaged area. A qualified maintenance officer should perform a complete evaluation prior to releasing the aircraft for flight.

Continued next page

Examples of Special Inspections (Continued)

#### Aircraft Damage Sustained as a Result of Flight Through

<u>Volcanic Ash:</u> Inadvertent flight through volcanic ash clouds is an infrequent but very real and significant hazard. Numerous commercial and military aircraft have sustained tremendous damage at jet airway altitudes hundreds of miles from active volcanoes. If flight through a volcanic ash cloud is known or suspected, contact Commandant (G-SEA) for decontamination procedures. Depot and Original Equipment Manufacturer (OEM) support will most likely be required.

**Special Inspection Due to Maintenance:** Some maintenance procedures require special inspections be performed as a follow up check. This inspection assures that the maintenance procedure was performed correctly and/or that the assembly or equipment is not defective.

Example: After installing the Main Rotor Head (MRH) on a HH-60J helicopter the MPC requires a torque check be performed on the MRH shaft nut bolts after 9-11 flight hours.

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#### Introduction

The administrative process for documenting special inspections should be the same at all units but may vary slightly. Generally, you should document special inspections as outlined in the following tables.

Documenting a Special Inspection Due to a Specific Incident When an incident occurs that requires a special inspection, the following steps should be performed to document performance of the inspection.

Step	Action				
1	Write up the discrepancy describing the incident.				
	If	Then			
	the incident occurred during flight	write up the discrepancy on the CG-4377 Part III			
	the incident did not occur during flight	write up the discrepancy on the CG-4377B			
2	Perform the inspection in accordance with the applicable maintenance publication.				
3	Sign off the discrepancy written up in Step 1 and complete any applicable MPC's.				
4	Follow the appropriate instruction below depending on the outcome of the inspection.				
	the outcome of the inspec	1 0			
	If	1 0			
		tion.			

Scheduling a Special Inspection Due to Maintenance After installing the MRH on the HH-60J helicopter, a torque check is required to be performed every 10 flight hours until the torque stabilizes, or for a maximum of four times. This type of special inspection is scheduled on the CG-5181 in the Special Inspections/Services Record section as illustrated in the example on the following page (refer to the example while reading the table).

#### Special Inspection Step-Action Table

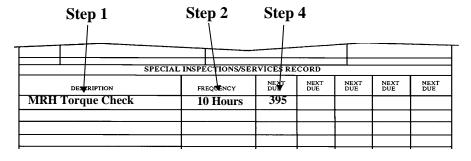
Schedule special inspections by performing the steps in the following table:

Step	Action			
1	Enter the description of the inspection (MRH Torque Check)			
2	Ente	Enter the frequency of the inspection (10 hours)		
3	Calculate the Next Due hours by performing the following steps:			
		Step Action		
	1 Round off the aircraft flight hours to t nearest whole number		Round off the aircraft flight hours to the nearest whole number	
		2	Add 10 hours to the number from Step 1	
4	Enter the number from Step 3 in the first available Next Due block (from the left)			

Continued next page

Example of
Scheduling a
Special
Inspection Due to
Maintenance

In the following example the aircraft had 384.5 flight hours at the time the MRH was installed. The number 384.5 is rounded up to 385 and then 10 hours is added to it, therefore 395 is entered in the Next Due block to schedule the inspection. Refer to the step-action table on the proceeding page.



Documenting
Performance of a
Special
Inspection Due to
Maintenance

When the inspection in the example above becomes due, the technician will perform the following steps to document performance of the inspection:

Step	Action					
1	Write up a discrepancy on the CG-4377B, requiring the inspection to be performed					
2	Perform the inspection in accordance with the applicable maintenance publication					
3	Document completion of the inspection by performing the applicable step below					
	If	Then				
	the torque is stable	sign off the discrepancy written up in Step 1 and notify your supervisor				
	the torque is not stable	sign off the discrepancy written up in Step 1 and schedule another one by adding 10 hours to the total aircraft flight hours and enter that number in the next blank Next Due block on the CG-5181				

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_	4 •	
( )	uestion	c
w	uesuun	3

Answer the following questions on aircraft inspections:

1.	What is the definition of an inspection?
2.	The purpose of aircraft inspections is to
3.	What two categories are aircraft inspections grouped into?
	a b
4.	Specific inspection requirements for each aircraft type can be found in what manual?
5	What is the definition of routine inspections?
	Continued next page

Questions
(Continued)

6. Match each inspection listed in column B to the appropriate type of inspection listed in column A. Use each letter only once.

	Column A	Column B
	,, 1. Routine Inspection	a. Hourly/Weekly
	,, 2. Special Inspection	b. Lightning Strike
		c. MRH Torque Check
		d. Postflight
		e. Preflight
		f. TCTO
7.	Which routine inspection is performed to the day?	pefore the first flight of
8.	On which ACMS report will TCTO's ap	opear for action?
9.	If a maintenance procedure requires a for inspection, it should be scheduled on the	

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#### **Feedback**

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	A periodic or on-condition maintenance check performed on assigned aircraft	3
2.	ensure the aircraft are maintained in a safe, serviceable condition	3
3.	<ul><li>a. Routine Inspections</li><li>b. Special Inspections</li></ul>	3
4.	Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)	3
5.	Maintenance checks that are accomplished on a regular or scheduled basis.	4
6.	1. a, d, e 2. b, c, f	4 10, 11
7.	7. Preflight	
8.	ACMS Maintenance Due List	10
9.	CG-5181	14

Syllabus 5.B.01c

#### **Performance**

PERFORM special inspections of aircraft and aviation equipment.

### Performance Objective 1

Given the necessary equipment and publications, **PERFORM** special inspections of aircraft IAW the applicable publication.

#### **NOTE**

The number and types of special inspections are too numerous to provide a detailed reference list for each aircraft type. Instructions for performing special inspections are covered by the ACMS Maintenance Procedure Cards, the aircraft's maintenance publications, and issued Time Compliance Technical Orders (TCTO's).

### Performance Objective 2

Given the necessary equipment and publications, **PERFORM** special inspections of aviation equipment IAW the applicable publication.

#### **NOTE**

The number and types of special inspections are too numerous to provide a detailed reference list for all aviation equipment. Instructions for performing special inspections are covered by the ACMS Maintenance Procedure Cards, the equipment maintenance publications, and issued Time Compliance Technical Orders (TCTO's).

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#### **Objectives**

To successfully complete this assignment, you must study the references and master the following objectives:

- **STATE** the purpose of a Time Compliance Technical Order (TCTO).
- **STATE** the organization that can authorize modifications of Coast Guard aircraft.
- **DEFINE** the Aviation Computerized Maintenance System (ACMS) reports that TCTO's appear on and the purpose.
- **DEFINE** the characteristics of TCTO's.
- **DEFINE** the characteristics of Special Compliance Technical Orders (SCTO's)

#### References

The information that you must study is contained in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Aeronautical Engineering TCTO Process Guide, CGTO PG-85-00-40

5.B.02c Overview

#### This assignment introduces you to the process of making Introduction modifications to aircraft and aviation equipment. **Notice to Student** There is no information presented in this pamphlet, however, you must read and study the material in the references to prepare for the Self-Quiz, Pamphlet Review Quiz, and the EOCT. In This This assignment contains the following: **Assignment** Subject Page Aircraft Modifications Self-Quiz......5 Syllabus......7

#### **Before You Begin**

To complete this assignment, it is recommended that you do the following:

- Get permission from the reference custodian to use the documents
- Get a current copy of each of the references listed, usually from Quality Assurance
- Ensure that no pages in the references are missing or damaged
- DO NOT write in references or remove any pages
- Return the references to the custodian when you have finished the lesson

Continued next page

#### **How to Proceed**

To successfully complete this assignment, follow the steps listed below:

Step	Action					
1	Read the objectives on page 1					
2	Read and study the material in each reference listed below and ensure that you can fulfill each objective:					
	Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)					
	<ul> <li>Chapter 5, Directives and Publications, (Paragraph on TCTO's)</li> <li>Chapter 8, Aircraft Inspections, (Section on Special Inspections)</li> </ul>					
	<ul> <li>Aeronautical Engineering TCTO Process Guide, CGTO PG-85-00-40</li> </ul>					
	<ul> <li>Chapter 1, Coast Guard TCTO's</li> <li>Chapter 2, Coast Guard Message TCTO's</li> <li>Chapter 3, Contractor Produced Coast Guard TCTO's</li> <li>Chapter 4, TCTO Guidelines</li> <li>Chapter 5, CG Special Compliance Technical Order's (SCTO), (TOPS 1)</li> </ul>					
3	Take the self-quiz and review the feedback. If you have no trouble with the self-quiz, you should be well prepared for the pamphlet review quiz and the EOCT.					

Questions	An	nswer the following questions on aircraft modifications:	
	1.	What is the purpose of a Time Compliance Technical Order?	
	2.	To track compliance of a TCTO, it will appear on which ACMS report?	
	3.	Which digits in a TCTO number indicate the applicable ATA chapter?	
	4.	Which Coast Guard organization can authorize modifications of aircraft?	

5. What type of TCTO is used for rapid dissemination of

information, generally of an urgent or safety-of-flight nature?

6. A Special Compliance Technical Order (SCTO) provides a means to implement aircraft, Mandatory Special Requirements (MSR), and Avionics Tracking System (ATS) changes which are not

#### Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section in the applicable reference.

Question	Answer	Reference
1	A TCTO generally requires a physical change to an aircraft or a special inspection	COMDTINST M13020.1 (series) Page 5-3
2	Maintenance Due List (MDL)	COMDTINST M13020.1 (series) Page 5-4
3	Second and Third	COMDTINST M13020.1 (series) Page 5-4
4	Commandant (G-SEA)	COMDTINST M13020.1 (series) Page 5-4
5	Message TCTO	COMDTINST M13020.1 (series) Page 5-4
6	time sensitive	CGTO PG-85-00-40 Page 5-1

**Syllabus** 5.B.02c Performance PERFORM authorized modifications of aircraft and aviation equipment. **Precautions** You must be aware of the following caution and note before modifying aircraft or aviation equipment. **CAUTION** Only authorized modifications will be made on aircraft and aviation equipment. TCTO's can be authorized only by Commandant (G-SEA). NOTE TCTO's will be accomplished using standard aircraft maintenance practices and following the step-by-step procedures published in the TCTO. **Performance** Given the necessary equipment, directions, and publications, **Objective 1 PERFORM** authorized modifications of aircraft IAW an issued TCTO and applicable publications. **Performance** Given the necessary equipment, directions, and publications, **Objective 2 PERFORM** authorized modifications of aviation equipment IAW an issued TCTO and applicable publications.

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **LIST** the six general troubleshooting guidelines in the proper order.
- **STATE** in writing the purpose of performing a visual inspection during the troubleshooting process.
- **STATE** in writing what you should do if unrelated discrepancies are found while troubleshooting.
- **STATE** in writing the purpose of performing an operational check during the troubleshooting process.
- **STATE** in writing what troubleshooting step includes verifying the suspect component.
- **LIST** a minimum of six of the common methods used to verify the condition of suspect components.
- **LIST** five of the more common types of corrective actions used to correct a malfunction.
- **STATE** in writing the purpose of conducting a final operational check during the troubleshooting process.

#### References

This assignment is original material designed and developed by the Subject Matter Specialists at AVTECHTRACEN and has no reference number or publication name.

5.B.GTG Overview

#### Introduction

This assignment is an introduction to the General Troubleshooting Guidelines that will assist you during the actual performance of the troubleshooting qualifications. Knowledge of these guidelines is essential to becoming a competent troubleshooter.

#### In This Assignment

This assignment contains the following:

Subject	Page
Five General Troubleshooting Steps	3
Step 1 - Visual Inspection	4
Step 2 - Operational Check	5
Step 3 – Classify the Malfunction	6
Step 4 - Isolate and Locate the Malfunction	7
Step 5 - Correct the Malfunction	9
Step 5 - Conduct Final Operational Check	10
General Troubleshooting Guidelines Self-Quiz	11
General Troubleshooting Guidelines Self-Quiz Feedback	14

#### Introduction

Troubleshooting is one of the most valued skills in the aviation workforce. There are standard time-proven steps used for troubleshooting aircraft systems. These steps are essential and apply to both mechanical and electrical systems.

#### Five General Troubleshooting Steps

The following table lists the five general troubleshooting steps that are used, in sequence, when troubleshooting aircraft systems.

Step	Action
1	Conduct a visual inspection of the malfunctioning system.
2	Perform an operational check of the malfunctioning system.
3	Classify the Malfunction.
4	Isolate and Locate the malfunctioning component/wire.
5	Correct the malfunction.
6	Conduct a final operational check of the repaired system.

Each of the six troubleshooting steps are listed in more detail on the following pages.

A visual inspection is performed to identify any obvious discrepancies that could be the actual cause of a malfunction, or to identify discrepancies that could possibly cause further damage to equipment or injury to personnel.

### Visual Inspection Guidelines

The table below lists some of the more common guidelines that you should follow when performing a visual inspection:

If visually inspecting	Then check for
circuit protectors	tripped, overheating, security, cleanliness (corrosion), mechanical condition.
control switches	position, security, overheating, cleanliness (corrosion), mechanical condition.
equipment	security, cleanliness (corrosion), overheating, burnt odor, mechanical condition, missing parts (hardware).
mechanical linkages	binding, interference, distortion, excessive play, missing hardware, incorrect assembly.
wires	signs of overheating, security, chafing, cleanliness (corrosion), proper routing.
lines/connections	leaking (fluids, air, gases), security, routing.
reservoirs	proper fluid levels, correct fluid type, overheated fluid, leaks, proper configuration of valves, security of caps/plugs.

### Unrelated Discrepancies

Unrelated discrepancies that are found during your visual inspection should be entered in the aircraft's logbook as a separate discrepancy.

An operational check of the malfunctioning system should be performed IAW applicable publications to gather as much additional information as possible about the current state of the system. This information will assist you in making logical decisions as you move through the General Troubleshooting steps.

## Examples of Malfunction Indications

Listed below are some of the more common examples of malfunction indications that should be monitored and/or noted:

If the indication involves	Then check for
speed, temperature, or pressure	fluctuations, lack of indication, excessive or disproportional indications, etc.
sequence	number of cycles, completion, duration, etc.
illumination	intensity, lack of, flashing or flickering, etc.
abnormal current flow	dimming of lights, slowing of motors, overload warnings, overheated battery(s), chattering of relays, etc.
arcing/sparking	flashes, sounds of welding, burning odor, etc.
unusual noises	grinding, whining, scraping, rubbing, etc.
vibrations	vibrating controls (yoke, collective, cyclic, throttles), equipment, lines, cables, etc.

### Unrelated Discrepancies

Unrelated discrepancies that are found during the operational check should be entered in the aircraft's logbook as a separate discrepancy.

Classify the Malfunction is the process of identifying the malfunction as either electrical or mechanical in reference to any findings in the previous steps.

### Classification Examples

Listed Below are examples of malfunction classifications:

If classified as	Then it includes
Mechanical	Pumps, linkages, actuators, drives, valves, etc.
Electrical	Switches, sensors, wires, relays, motors, etc.

### Referencing **Publications**

Classifying the malfunction enables you to reference the appropriate section of the applicable publication.

# Isolate the Malfunction Description

Isolating the malfunction is the process of narrowing down from a list of possible components to a list of suspect components. This is done by eliminating all of the components/wires that are determined to be functioning normally during the Operational Check, (Step 2).

# Locate the Malfunction Description

Locating the malfunction is done by physically locating the suspected malfunctioning component/wire and then performing a visual inspection on it, (Step 1).

#### Examples of Locating Methods

Listed below are examples of the different types of publications used to locate a component or wire, depending on aircraft type:

- Avionics Operation and Maintenance Manual
- Avionics System Maintenance Manual
- Fault Isolation Manual (FIM)
- General System (GS)
- Illustrated Parts Breakdown or Catalog (IPB) or (IPC)
- Job Guide Manual (JGM)
- Maintenance Manuals (MM)
- Maintenance Procedure Cards
- Maintenance Procedures Manual
- Overhaul Manual
- Principals Of Operation Manual
- Structural Repair Manual
- Testing And Troubleshooting Manual
- Wiring Diagram Manuals (WDM)

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#### 5.B.GTG Step 4 - Isolate and Locate the Malfunction (Continued)

### Verifying Suspect Components

After you have compiled your list of suspect components and performed a visual inspection on each, verify their condition as either faulty or serviceable IAW the applicable publication.

# Examples of Verifying Methods

Listed below are examples of some common methods used to verify the condition of components:

- Calibration checks
- Comparison checks (dual systems)
- Continuity checks
- Dimensional checks
- Elapsed time checks
- Megger checks (insulation breakdown)
- Pressure/Vacuum checks
- Rotational force checks
- Self tests
- Spring scale checks
- Temperature checks
- Tension checks
- Voltage checks

After the malfunctioning component/wire has been identified and verified as faulty, the malfunction should be corrected IAW the applicable publications.

#### **Corrective Action**

The applicable publication will guide you to the appropriate corrective action for the given malfunction, depending on your findings from Isolate and Locate, (Step 3).

# Examples of Corrective Actions

Listed below are examples of some of the more common types of corrective actions used to correct a malfunction:

- Adjust
- Calibrate
- Repair
- Replace
- Re-set

The repaired system must be powered-up and operated to verify that the malfunction has been corrected IAW the applicable publications.

#### Final Operational Check Decision Table

The following table will help you decide whether you were successful at troubleshooting the applicable system:

If	Then
the repaired system is functioning normally IAW the applicable publication.	ensure ALL paperwork and aircraft logbook entries are complete.
the malfunction has NOT been corrected or a new discrepancy has been identified.	refer to Step 1 of the General Troubleshooting Guidelines.

1. List in order, the five general troubleshooting guidelines.
Step 1;
Step 2;
Step 3;
Step 4;
Step 5;
Step 6;
2. The purpose of performing a visual inspection during troubleshooting is to
, or to
3. If unrelated discrepancies are found while troubleshooting you should
4. The purpose for performing an operational check during troubleshooting the process is to
5. When you classify the malfunction, you are making the distinction between an or malfunction.
6. What troubleshooting step includes verifying the suspect components?

### 5.B.GTG General Troubleshooting Guidelines Self-Quiz (Continued)

Questions (Continued)	condition of suspect components.
	1
	2
	3
	4
	5
	6
	8. List five of the more common types of corrective actions used to correct a malfunction.
	1
	2
	3
	4
	5
	9. The purpose of conducting a final operational check during the
	troubleshooting process is to

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### 5.B.GTG General Troubleshooting Guidelines Self-Quiz Feedback

### Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	Step 1; Conduct a visual inspection Step 2; Perform an operational check Step 3; Classify the malfunction Step 4; Isolate the malfunctioning component/wire Step 5; Correct the malfunction Step 6; Conduct a final operational check	3
2.	identify any obvious discrepancies that could be the actual cause, or to identify discrepancies that could possibly cause further damage to equipment or injury to personnel.	4
3.	enter the discrepancy in the aircraft's logbook.	4 or 5
4.	gather as much additional information as possible about the current state of the system	5
5.	Electrical or mechanical	6
6.	Isolate and Locate the malfunction.	8

### **General Troubleshooting Guidelines Self-Quiz Feedback (Continued)**

## Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
7.	Any six of the following are acceptable:  Calibration checks Comparison checks (dual systems) Continuity checks Dimensional checks Elapsed time checks Megger checks (insulation breakdown) Pressure/Vacuum checks Rotational force checks Self tests Spring scale checks Temperature checks Tension checks Voltage checks	8
8.	Adjust Calibrate Repair Replace Re-set	9
9.	verify that the malfunction has been corrected IAW the applicable publications.	10

### For More Information

More detailed information about specific troubleshooting procedures may be found in the "Troubleshooting" section of the applicable aircraft maintenance publication. However, not all maintenance publications contain a troubleshooting section.

5.B.GTG Blank Page

**Syllabus** 5.B.01 **Performance** TROUBLESHOOT hydraulic system discrepancies to the component/wire level. **Performance** Given a hydraulic system discrepancy and General Troubleshooting **Objective 1** Guidelines, PERFORM a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Performance Given a hydraulic system discrepancy and necessary equipment, **Objective 2 PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 29 • MPC Index, Chapter 29 **HH-60J** • A1-H60CA-450-300 • MPC Index, Chapter 29 HC-130H • 1C-130H-2-29JG-00-1-1 • 1C-130H-2-29JG-00-1-2 • MPC Index, Chapter 29 **HU-25A** 

• 1U-25A-2, Chapter 29

• MPC Index, Chapter 29

1

Given a hydraulic system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given a hydraulic system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

#### **HH-65A**

- 1H-65A-2-1, Chapter 29
- 1H-65A-2-2, Chapter 29
- 1H-65A-4, Chapter 29
- MPC Index, Chapter 29

#### **HH-60J**

- A1-H60CA-450-200
- A1-H60CA-450-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 29

### Performance Objective 4 (continued)

#### HC-130H

- 1C-130H-2-29FI-00-1
- 1C-130H-2-29GS-00-1
- 1C-130H-2-13, Section 3
- 1C-130H-4, Section II
- MPC Index, Chapter 29

#### HU-25A

- 1U-25A-2, Chapter 29
- 1U-25A-2-9, Chapter 29
- 1U-25A-4, Chapter 29
- MPC Index, Chapter 29

Given a hydraulic system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

**HH-65A** 

- 1H-65A-2-1, Chapter 29
- 1H-65A-2-2, Chapter 29
- MPC Index, Chapter 29

**HH-60J** 

- A1-H60CA-450-200
- A1-H60CA-WCR-000
- MPC Index, Chapter 29

HC-130H

- 1C-130H-2-29JG-00-1-1
- 1C-130H-2-29JG-00-1-2
- MPC Index, Chapter 29

**HU-25A** 

- 1U-25A-2, Chapter 29
- 1U-25A-2-9, Chapter 29
- MPC Index, Chapter 29

Given a hydraulic system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А	
• 1H-65A-2-1, Chapter 29	
• MPC Index, Chapter 29	
НН-60Ј	
• A1-H60CA-450-300	
• MPC Index, Chapter 29	
НС-130Н	
• 1C-130H-2-29JG-00-1-1	
• 1C-130H-2-29JG-00-1-2	
HU-25A	
• 1U-25A-2, Chapter 29	
MPC Index, Chapter 29	

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Performance	TROUBLESHOOT aircraft fuel system discrepancies to the component/wire level.	
Performance Objective 1	Given an aircraft fuel system discrepancy and Ge Troubleshooting Guidelines, <b>PERFORM</b> a visua the General Troubleshooting Guidelines (section in the General Troubleshooting Guidelines)	l inspection IAW
Performance Objective 2	Given an aircraft fuel system discrepancy and nece <b>PERFORM</b> an operational check of the applicable or more of the following references:	
	HH-65A	
	• 1H-65A-2-1, Chapter 28	
	• 1H-65A-11-72-2B2	
	• MPC Index, Chapter 28	
	НН-60Ј	
	• A1-H60HA-460-200	
	• A1-T700-MMI-200	
	• MPC Index, Chapter 28	
	НС-130Н	
	• 1C-130H-2-28JG (series)	
	• MPC Index, Chapter 28	
	HU-25A	
	• 1U-25A-2, Chapter 28	
	• MPC Index, Chapter 28	

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5.B.02

Given an aircraft fuel system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft fuel system discrepancy and the necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 28
- 1H-65A-2-2, Chapter 28
- 1H-65A-4, Chapter 28
- MPC Index, Chapter28

#### **HH-60J**

- A1-H60HA-460-100
- A1-H60HA-460-300
- A1-H60HA-460-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 28

### Performance Objective 4 (Continued)

### HC130H

- 1C-130H-4
- 1C-130H-2-13, Section 5
- 1C-130H-2-28FI (series)
- 1C-130H-2-28GS-00-1
- MPC Index, Chapter 28

### **HU-25A**

- 1U-25A-2
- 1U-25A-4
- MPC Index, Chapter 28

Given an aircraft fuel system discrepancy and the necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### **HH-65A** • 1H-65A-2-1 • 1H-65A-2-2 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 28 **HH-60J** • A1-H60HA-460-300 • A1-H60CA-WCR-000 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 28 HC-130H • 1C-130H-2-28JG (series) • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 28 **HU-25A** • 1U-25A-2 • 1U-25A-2-9 • AFTO 1-1A-14 (NAVAIR 01-14-505)

• MPC Index, Chapter 28

Given an aircraft fuel system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

H	H-65A
•	1H-65A-2-1
•	1H-65A-11-72-2B2
•	MPC Index, Chapter 28
Н	Н-60Ј
•	A1-H60HA-460-200
•	A1-T700-MMI-200
•	MPC Index, Chapter 28
Н	С-130Н
•	1C-130H-2-28JG (series)
•	MPC Index, Chapter 28
Н	U-25A
•	1U-25A-2, Chapter 28
•	MPC Index, Chapter 28

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**Syllabus** 5.B.03 **Performance** CALIBRATE fuel quantity indicating system. **Performance** Given a discrepancy for an aircraft fuel quantity indicating system **Objective** and the necessary equipment, **CALIBRATE** the fuel quantity indicating system IAW one or more of the following references: **HH-65A** • MPC Index, Chapter 28 **HH-60J** • A1-H60HA-460-300 • MPC Index, Chapter 28 HC-130H • 1C-130H-2-28JG-40-1 • MPC Index, Chapter 28 **HU-25A** 

• 1U-25A-2, Chapter 28

• MPC Index, Chapter 28

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Syllabus 5.B.04

#### **Performance**

RIG and ADJUST power controls, fuel selectors, and shut-off valve linkages.

## Performance Objective

Given an engine power control, fuel selector, or shut-off valve rigging discrepancy and the necessary equipment, **RIG** and **ADJUST** the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 76
- MPC Index, Chapters 28, 72, 73, and 76

HH-60J

- A1-H60CA-220-100
- A1-H60CA-220-200
- A1-H60CA-220-300
- MPC Index, Chapter 76

HC-130H

- 1C-130H-2-61JG-20-1
- 1C-130H-2-71JG-00-2
- 1C-130H-2-76JG-00-1
- 1C-130H-10
- MPC Index, Chapters 61, 71, 73, and 76

HU-25A

- 1U-25A-2, Chapters 73 and 76
- MPC Index, Chapters 71, 73, 75, and 76

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Syllabus 5.B.05

### **Performance** TROUBLESHOOT aircraft lubrication system discrepancies. Given an aircraft lubrication system discrepancy and the General **Performance** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW **Objective 1** the General Troubleshooting Guidelines (section 5.B.GTG). Given an aircraft lubrication system discrepancy and necessary **Performance** equipment, **PERFORM** an operational check of the applicable **Objective 2** system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapters 63, 79 • 1H-65A-2-2, Chapters 63, 79 • MPC Index, Chapters 63, 79 **HH-60J** • A1-H60CA-260-200 • MPC Index, Chapter 79 HC-130H • 1C-130H-2-71JG-00-2 • 1C-130H-2-79JG-00-1 • MPC Index, Chapter 79 HU-25A

• 1U-25A-2, Chapter 79

• MPC Index, Chapter 79

1

• 2J-ATF3-2-1

Given an aircraft lubrication system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft lubrication system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapters 63, 79
- 1H-65A-2-3, Chapters 63, 79
- 1H-65A-11-72-2B2
- 1H-65A-11-72-4B2
- MPC Index, Chapter s 63, 79

#### **HH-60J**

- A1-H60CA-220-100
- A1-H60CA-260-200
- A1-H60JA-WDM-000
- MPC Index Chapter 79

### Performance Objective 4 (Continued)

#### HC-130H

- 1C-130H-2-70FI-00-1-2
- 1C-130H-2-13, Section 4
- 2J-T56-53
- 2J-T56-56
- 2J-T56-44
- MPC Index, Chapter 79

#### **HU-25A**

- 1U-25A-2, Chapter 79
- 1U-25A-4
- 2J-ATF3-2-1, Chapter 79
- MPC Index, Chapter 79

Given an aircraft lubrication system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapters 63, 79
- 1H-65A-2-2, Chapters 63, 79
- 1H-65A-11-72-2B2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 63, 79

#### **HH-60J**

- A1-H60CA-260-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 63, 79

#### HC-130H

- 1C-130H-2-79JG-00-1
- 2J-T56-53
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 79

#### **HU-25A**

- 1U-25A-2, Chapter 20
- 2J-ATF3-2-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 79

Given an aircraft lubrication system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А	
• 1H-65A-2-1, Chapters 63, 79	
• 1H-65A-11-72-2B2	
• MPC Index, Chapters 63, 79	
НН-60Ј	
• A1-H60CA-260-200	
• MPC Index, Chapter 79	
НС-130Н	
• 1C-130H-2-71JG-00-2	
• 1C-130H-2-79JG-00-1	
• MPC Index, Chapter 79	
HU-25A	
• 1U-25A-2, Chapter 79	
• 2J-ATF3-2-1	
• MPC Index, Chapter 79	

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Performance	TROUBLESHOOT landing gear system discrepancies to the component/wire level.
Performance Objective 1	Given an aircraft landing gear system discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).
Performance Objective 2	Given an aircraft landing gear system discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system IAW one or more of the following references:
	HH-65A
	• 1H-65A-2-1, Chapter 32
	• MPC Index, Chapter 32
	HH-60J
	• A1-H60HA-110-200
	• MPC Index, Chapter 32
	НС-130Н
	• 1C-130H-2-32JG (series)
	• 1C-130H-2-32GS (series)
	• MPC Index, Chapter 32
	HU-25A
	• 1U-25A-2, Chapter 32
	• MPC Index, Chapter 32

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Given an aircraft landing gear system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft landing gear system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

**HH-65A** 

- 1H-65A-2-1, Chapter 32
- 1H-65A-2-3, Chapter 32
- 1H-65A-4, Chapter 32

**HH-60J** 

- A1-H60HA-110-100
- A1-H60HA-110-200
- A1-H60JA-WDM-000
- MPC Index, Chapter 32

HC-130H

- 1C-130H-2-32FI-00-1-1
- 1C-130H-2-32FI-00-1-2
- 1C-130H-2-32JG-00-1
- 1C-130H-4
- MPC Index, Chapter 32

**HU-25A** 

- 1U-25A-2, Chapter 32
- 1U-25A-2-9, Chapter 32
- MPC Index, Chapter 32

Given an aircraft landing gear system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### HH-65A • 1H-65A-2-1, Chapter 32 • 1H-65A-2-2, Chapter 32 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 32 **HH-60J** • A1-H60HA-110-300 • A1-H60CA-WCR-000 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 32 **HC-130** • 1C-130H-2-32JG (series) • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 32 **HU-25A** • 1U-25A-2, Chapter 32 • AFTO 1-1A-14 (NAVAIR 01-14-505)

• MPC Index, Chapter 32

Given an aircraft landing gear system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
1H-65A-2-1, Chapter 32	
MPC Index, Chapter 32	
НН-60Ј	
A1-H60HA-110-200	
MPC Index, Chapter 32	
НС-130Н	
1C-130H 2-32JG (series)	
1C-130H-2-32GS (series)	
MPC Index, Chapter 32	
HU-25A	
1U-25A-2, Chapter 32	
MPC Index, Chapter 32	

Performance	TROUBLESHOOT aircraft brake system discrepancies to the component/wire level.  Given an aircraft brake system discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).	
Performance Objective 1		
Performance Objective 2	Given an aircraft brake system discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system IAW one or more of the following references:	
	HH-65A	
	• 1H-65A-2-1, Chapter 32	
	• MPC Index, Chapter 32	
	HH-60J	
	• A1-H60HA-110-200	
	• MPC Index, Chapter 32	
	НС-130Н	
	• 1C-130H-32JG (series)	
	• 1C-130H-32GS (series)	
	• MPC Index, Chapter 32	
	HU-25A	
	• 1U-25A-2, Chapter 32	
	• MPC Index, Chapter 32	

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Given an aircraft brake system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft brake system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 32
- 1H-65A-2-2, Chapter 32
- 1H-65A-4, Chapter 32
- MPC Index, Chapter 32

**HH-60J** 

- A1-H60HA-110-100
- A1-H60HA-110-200
- A1-H60JA-WDM-000
- MPC Index, Chapter 32

HC-130H

- 1C-130H-2-32FI (series)
- 1C-130H-2-32GS(series)
- 1C-130H-2-32JG(series)
- 1C-130H-4

HU-25A

- 1U-25A-2, Chapter 32
- 1U-25A-4, Chapter 32
- MPC Index, Chapter 32

Given an aircraft brake system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### **HH-65A** • 1H-65A-2-1, Chapter 32 • 1H-65A-2-2, Chapter 32 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 32 **HH-60J** • A1-H60HA-110-300 • A-H60CA-WCR-000 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 32 HC-130H • 1C-130H-2-32GS (series) • 1C-130H-2-32JG(series) • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 32 **HU-25A** • 1U-25A-2, Chapter 32 • 1U-25A-2-9, Chapter 32 • AFTO 1-1A-14 (NAVAIR 01-14-505)

• MPC Index, Chapter 32

Given an aircraft brake system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 32	
• MPC Index, Chapter 32	
НН-60Ј	
• A1-H60HA-110-200	
• MPC Index, Chapter 32	
HC-130H	
• 1C-130H-32JG (series)	
• 1C-130H-32GS (series)	
• MPC Index, Chapter 32	
HU-25A	
• 1U-25A-2, Chapter 32	
• MPC Index, Chapter 32	

Performance	TROUBLESHOOT aircraft powerplant system discrepancies to the component/wire level.	
Performance Objective 1	Given an aircraft powerplant system discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).	
Performance Objective 2	Given an aircraft powerplant system discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system IAW one or more of the following references:	•
	HH-65A	7
	• 1H-65A-2-1, Chapters 71 thru 80	
	• 1H-65A-11-72-2B2	
	• MPC Index, Chapters 70 thru 80	
	НН-60Ј	P
	• A1-H60CA-220-200	
	• A1-T700A-MMI-200	
	• MPC Index, Chapters 71 thru 80	
	НС-130Н	
	• 1C-130H-2-71JG-00-1 thru 80JG-00-1	
	• 2J-T56-53	
	• MPC Index, Chapters 71 thru 80	
	HU-25A	
	• 1U-25A-2, Chapters 71 thru 80	
	• 2J-ATF3-2-1	
	<ul> <li>MPC Index, Chapters 71 thru 80</li> </ul>	
	- III C mack, Chapters /1 and 00	

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Given an aircraft powerplant system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft powerplant system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** malfunction to the most probable component/wire IAW one or more of the following references:

#### **HH-65A**

- 1H-65A-2-1, Chapters 71 thru 80
- 1H-65A-4, Chapters 71 thru 80
- 1H-65A-11-72-4B2
- MPC Index, Chapters 71 thru 80

#### **HH-60J**

- A1-T700A-MMI-200
- A1-H60CA-220-400
- A1-T700A-IPB-400
- A1-H60JA-WDM-000
- MPC Index, Chapters 71 thru 80

### Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-70GS-00-1
- 1C-130H-2-70FI-00-1-1
- 1C-130H-2-70FI-00-1-2
- 1C-130H-2-70JG-00-1 thru 80JG-00-1
- 1C-130H-2-13, Section 4
- 2J-T56-44
- 2J-T56-53
- 2J-T56-56
- MPC Index, Chapters 71 thru 80

### **HU-25A**

- 1U-25A-2, Chapters 71 thru 80
- 2J-ATF3-2-1
- MPC Index, Chapters 71 thru 80

Given an aircraft powerplant system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1
- 1H-65A-2-2
- 1H-65A-11-72-2B2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

### **HH-60J**

- A1-T700A-MMI-200
- A1-H60CA-220-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

### HC-130H

- 1C-130H-2-70JG-00-1 thru 80JG-00-1
- 2J-T56-53
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

### **HU-25A**

- 1U-25A-2, Chapters 71 thru 80
- 1U-25A-2-9
- 2J-ATF3-2-1
- 2J-ATF3-2-2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 71 thru 80

Given an aircraft powerplant system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

### HH-65A • 1H-65A-2-1, Chapters 71 thru 80 • 1H-65A-11-72-2B2 • MPC Index, Chapters 70 thru 80 **HH-60J** • A1-H60CA-220-200 • A1-T700A-MMI-200 • MPC Index, Chapters 71 thru 80 HC-130H • 1C-130H-2-71JG-00-1 thru 80JG-00-1 • 2J-T56-53 • MPC Index, Chapters 71 thru 80 **HU-25A** • 1U-25A-2, Chapters 71 thru 80 • 2J-ATF3-2-1 • MPC Index, Chapters 71 thru 80

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#### **Performance**

TROUBLESHOOT aircraft auxiliary power unit (APU) system discrepancies to the component/wire level.

# Performance Objective 1

Given an aircraft auxiliary power unit discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft auxiliary power unit discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

### **HH-65A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

**HH-60J** 

• A1-H60CA-240-200

HC-130H

- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- 1C-130H-2-49JG-00-1-1
- 1C-130H-2-49JG-00-1-2
- MPC Index, Chapter 49

HU-25A

- 1U-25A-2, Chapter 49
- MPC Index, Chapter 49

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Given an aircraft auxiliary power unit discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft auxiliary power unit discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

### HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- A1-H60CA-240-200
- A1-H60CA-240-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 49

### Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-49GS-00-1
- 1C-130H-2-49JG-00-1-2
- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- 1C-130H-2-49FI-00-1
- 1C-130E-2-49FI-00-1
- 1C-130H-2-13, Section 4
- 1C-130H-4
- MPC Index, Chapter 49

### **HU-25A**

- 1U-25A-2, Chapter 49
- 1U-25A-4, Chapter 49
- 1U-25A-2-9, Chapter 49
- MPC Index, Chapter 49

Given an aircraft auxiliary power unit discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HH-60J**

- A1-H60CA-240-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 49

### HC-130H

- 1C-130H-2-49JG-00-1-1
- 1C-130H-2-49JG-00-1-2
- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 49

### HU-25A

- 1U-25A-2, Chapter 49
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 49

Given an aircraft auxiliary power unit and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

### **HH-65A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HH-60J

• A1-H60CA-240-200

HC-130H

- 1C-130E-2-49JG-00-1-1
- 1C-130E-2-49JG-00-1-2
- 1C-130H-2-49JG-00-1-1
- 1C-130H-2-49JG-00-1-2
- MPC Index, Chapter 49

HU-25A

- 1U-25A-2, Chapter 49
- MPC Index, Chapter 49

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### **Performance**

TROUBLESHOOT aircraft pressurization system discrepancies to the component/wire level.

## Performance Objective 1

Given an aircraft pressurization system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

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# Performance Objective 2

Given an aircraft pressurization system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

### HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H

• 1C-130H-2-21JG-30-1

HU-25A

- 1U-25A-2, Chapter 21
- MPC Index, Chapter 21

Given an aircraft pressurization system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft pressurization system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

### HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### HC-130H

- 1C-130H-2-21GS-00-1
- 1C-130H-2-21FI-00-1-2
- 1C-130E-2-21JG-30-1
- 1C-130H-2-13, Section10
- 1C-130H-4
- MPC Index, Chapter 21

### **HU-25A**

- 1U-25A-2, Chapter 21
- 1U-25A-4, Chapter 21
- 1U-25A-2-9, Chapter 21
- MPC Index, Chapter 21

Given an aircraft pressurization system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### **HH-65A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### HC-130H

- 1C-130H-2-21JG-30-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

### **HU-25A**

- 1U-25A-2, Chapter 21
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

Given an aircraft pressurization system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

### **HH-65A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

• 1C-130H-2-21JG-30-1

### HU-25A \_\_\_\_\_\_\_\_

- 1U-25A-2, Chapter 21
- MPC Index, Chapter 21

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### **Performance**

TROUBLESHOOT aircraft air conditioning system discrepancies to the component/wire level.

## Performance Objective 1

Given an aircraft air conditioning system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

\_\_\_\_\_*M* 

# Performance Objective 2

Given an aircraft air conditioning system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 21
- MPC Index, Chapter 21

HH-60J

- A1-H60HA-410-200
- MPC Index, Chapter 21

HC-130H

- 1C-130H-2-21JG-00-1
- 1C-130H-2-21JG-10-1
- 1C-130H-2-21JG-20-1
- 1C-130H-2-21JG-40-1
- 1C-130H-2-21JG-50-1
- 1C-130H-2-21JG-50-2
- 1C-130H-2-21JG-60-1

HU-25A

- 1U-25A-2, Chapter 21
- MPC Index, Chapter 21

1

Given an aircraft air conditioning system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft air conditioning system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

### **HH-65A**

- 1H-65A-2-1, Chapter 21
- 1H-65A-2-2, Chapter 21
- 1H-65A-4, Chapter 21
- MPC Index, Chapter 21

### **HH-60J**

- A1-H60HA-410-100
- A1-H60HA-410-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 21

### Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-21GS-00-1
- 1C-130H-2-21FI-00-1-2
- 1C-130E-2-21JG-00-1
- 1C-130E-2-21JG-10-1
- 1C-130E-2-21JG-20-1
- 1C-130E-2-21JG-40-1
- 1C-130E-2-21JG-50-1
- 1C-130E-2-21JG-50-2
- 1C-130E-2-21JG-60-1
- 1C-130H-2-13, Section10

### **HU-25A**

- 1U-25A-2, Chapter 21
- 1U-25A-4, Chapter 21
- 1U-25A-2-9, Chapter 21
- MPC Index, Chapter 21

Given an aircraft air conditioning system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 21
- 1H-65A-2-2, Chapter 21
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

#### **HH-60J**

- A1-H60HA-410-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

### HC-130H

- 1C-130H-2-21JG-30-1
- 1C-130H-2-21JG-10-1
- 1C-130H-2-21JG-20-1
- 1C-130H-2-21JG-40-1
- 1C-130H-2-21JG-50-1
- 1C-130H-2-21JG-50-2
- 1C-130H-2-21JG-60-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

#### HU-25A

- 1U-25A-2, Chapter 21
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 21

Given an aircraft air conditioning system and necessary equipment, **PERFORM** an operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

Н	IH-65A	
•	1H-65A-2-1, Chapter 21	
•	MPC Index, Chapter 21	
H	HH-60J	
•	A1-H60HA-410-200	
•	MPC Index, Chapter 21	
Η	НС-130Н	
•	1C-130H-2-21JG-00-1	
•	1C-130H-2-21JG-10-1	
•	1C-130H-2-21JG-20-1	
•	1C-130H-2-21JG-40-1	
•	1C-130H-2-21JG-50-1	
•	1C-130H-2-21JG-50-2	
•	1C-130H-2-21JG-60-1	
Н	IU-25A	
•	1U-25A-2, Chapter 21	
•	MPC Index, Chapter 21	

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Performance	TROUBLESHOOT aircraft starter system discrepancies to the component/wire level.
Performance Objective 1	Given an aircraft starter system discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).
Performance Objective 2	Given an aircraft starter system discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system IAW one or more of the following references:
	НН-65А
	• 1H-65A-2-1, Chapter 80
	• MPC Index, Chapter 80
	НН-60Ј
	• A1-H60CA-220-200
	• MPC Index, Chapter 80
	НС-130Н
	• 1C-130H-2-80JG-00-1
	• 1C-130H-2-71JG-00-1
	HU-25A
	• 1U-25A-2, Chapter 80
	• MPC Index, Chapter 80

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Given an aircraft starter system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft starter system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 80
- 1H-65A-2-2, Chapter 80
- 1H-65A-4, Chapter 80
- MPC Index, Chapter 80

### **HH-60J**

- A1-H60CA-220-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 80

### HC-130H

- 1C-130E-2-70FI-00-1-1
- 1C-130E-2-80JG-00-1
- 1C-130H-2-13, Section 4
- MPC Index, Chapter 80

#### HU-25A

- 1U-25A-2, Chapter 80
- 1U-25A-4, Chapter 80
- 1U-25A-2-9, Chapter 80
- MPC Index, Chapter 80

Given an aircraft starter system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 80
- 1H-65A-2-2, Chapter 80
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

HH-60J

- A1-H60CA-220-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

HC-130H

- 1C-130H-2-80JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

**HU-25A** 

- 1U-25A-2, Chapter 80
- 1U-25A-2-9, Chapter 80
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 80

Given an aircraft starter system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 80	
• MPC Index, Chapter 80	
НН-60Ј	
• A1-H60CA-220-200	
• MPC Index, Chapter 80	
НС-130Н	
• 1C-130H-2-80JG-00-1	
• 1C-130H-2-71JG-00-1	
• MPC Index, Chapter 80	
HU-25A	
• 1U-25A-2, Chapter 80	
• MPC Index, Chapter 80	

Performance	TROUBLESHOOT ignition control system discrepancies to the component/wire level.	
Performance Objective 1	Given an aircraft engine ignition control system discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).	n
Performance Objective 2	Given an aircraft engine ignition control system discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system IAW one or more of the following references:	_
	НН-65А	Þ
	• 1H-65A-2-1, Chapter 74	
	• 1H-65A-11-72-2B2	
	НН-60Ј	Þ
	• A1-H60CA-220-200	
	• A1-T700A-MMI-200	
	• MPC Index, Chapter 74	
	НС-130Н	ø
	• 1C-130H-2-71JG-00-1	
	• 2J-T56-56	
	HU-25A	Þ
	• 1U-25A-2, Chapter 80	
	• 2J-ATF3-2-1, Chapter 74	

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Given an aircraft engine ignition system discrepancy and your findings from your previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft engine ignition control system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 74
- 1H-65A-2-2, Chapter 74
- 1H-65A-4
- 1H-65A-11-72-2B2
- 1H-65A-11-72-4B2
- MPC Index, Chapter 74

### **HH-60J**

- A1-H60CA-220-400
- A1-H60JA-WDM-000
- A1-T700A-MMI-400
- MPC Index, Chapter 74

### Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-80JG-00-1
- 1C-130H-2-13, Section 4
- 2J-T56-44
- 2J-T56-56
- MPC Index, Chapter 74

### **HU-25A**

- 1U-25A-2, Chapter 80
- 1U-25A-2-9, Chapter 80
- 1U-25A-4
- 2J-ATF3-2-1, Chapter 74

Given an aircraft engine ignition control system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### HH-65A • 1H-65A-2-1, Chapter 74 • 1H-65A-2-2, Chapter 74 • 1H-65A-11-72-2B2 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 74 **HH-60J** • A1-H60CA-220-200 • A1-H60CA-220-300 • A1-T700A-MMI-200 • A1-H60JA-WCR-000 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 74 HC-130H • 1C-130H-2-80JG-00-1 2J-T56-56 • AFTO 1-1A-14 (NAVAIR 01-14-505) • MPC Index, Chapter 74 **HU-25A** • 1U-25A-2, Chapter 80 • 2J-ATF3-2-1, Chapter 74

• AFTO 1-1A-14 (NAVAIR 01-14-505)

• MPC Index, Chapter 74

Given an aircraft engine ignition control system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А	
• 1H-65A-2-1, Chapter 74	
• 1H-65A-11-72-2B2	
НН-60Ј	
• A1-H60CA-220-200	
• A1-T700A-MMI-200	
• MPC Index, Chapter 74	
НС-130Н	
• 1C-130H-2-71JG-00-1	
• 2J-T56-56	
HU-25A	
• 1U-25A-2, Chapter 80	
• 2J-ATF3-2-1, Chapter 74	

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Performance	TROUBLESHOOT aircraft flight control system dis	screpancies.
Performance Objective 1	Given an aircraft flight control system discrepancy a Troubleshooting Guidelines, <b>PERFORM</b> a visual in the General Troubleshooting Guidelines (section 5.E.	nspection IAW
Performance Objective 2	Given an aircraft flight control system discrepancy a equipment, <b>PERFORM</b> an operational check of the system IAW one or more of the following reference	applicable
	HH-65A	
	• 1H-65A-2-1, Chapters 22 and 67	
	• 1H-65A-2-2, Chapters 22 and 67	
	• MPC Index, Chapters 22 and 67	
	НН-60Ј	
	• A1-H60CA-140-200	
	• A1-H60HA-560-200	
	• MPC Index, Chapters 22 and 67	
	НС-130Н	
	• 1C-130H-2-27JG (series)	
	• MPC Index, Chapter 27	
	HU-25A	
	• 1U-25A-2, Chapters 27, 55, and 57	
	• MPC Index, Chapters 27, 55, and 57	
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Given an aircraft flight control system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft flight control system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

### **HH-65A**

- H-65A-2-1, Chapters 22 and 67
- 1H-65A-2-2, Chapters 22 and 67
- 1H-65A-4, Chapters 22 and 67
- MPC Index, Chapters 22 and 67

### **HH-60J**

- A1-H60HA-140-100
- A1-H60HA-140-400
- A1-H60HA-560-100
- A1-H60HA-560-400
- A1-H60JA-WDM-000
- MPC Index, Chapters 22 and 67

### Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-27FI-00-1
- 1C-130H-2-27GS-00-1
- MPC Index, Chapter 27

### **HU-25A**

- 1U-25A-2, Chapters 27, 55, and 57
- MPC Index, Chapters 27, 55, and 57

Given an aircraft flight control system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 22 and 67
- 1H-65A-2-2, Chapters 22 and 67
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 22 and 67

HH-60J

- A1-H60HA-140-300
- A1-H60HA-560-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 22 and 67

HC-130H

- 1C-130H-2-27JG (series)
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 27

HU-25A

- 1U-25A-2, Chapters 27, 55, and 57
- 1U-25A-2-9, Chapters 27, 55, and 57
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 27, 55, and 57

Given an aircraft flight control system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

H	IH-65A	
•	1H-65A-2-1, Chapters 22 and 67	
•	1H-65A-2-2, Chapters 22 and 67	
•	MPC Index, Chapters 22 and 67	
H	IH-60J	
•	A1-H60CA-140-200	
•	A1-H60HA-560-200	
•	MPC Index, Chapters 22 and 67	
H	IC-130H	
•	1C-130H-2-27JG (series)	
•	MPC Index, Chapter 27	
H	IU-25A	
•	1U-25A-2, Chapters 27, 55, and 57	
•	MPC Index, Chapters 27, 55, and57	

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### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **LIST** the two general steps of rigging any aircraft.
- **SELECT** the definition of the named check from the list of possible definitions.
- **WRITE** the tools used for checking angles.
- WRITE the tool used to measure the installed tension of aircraft control cables.
- **WRITE** the tool used for rigging rotor-wing aircraft.
- **WRITE** the tool used for measuring linear distances for aircraft rigging applications.
- **STATE** the standard warning concerning aircraft flight controls with reference to an aircraft's hydraulic system.
- **STATE** the location where the Maintenance Flight Safety Warning (red tag) must be installed before performing aircraft rigging.
- **STATE** the publication which describes an appropriate functional check flight after aircraft rigging is performed.
- **STATE** the requirement that an aircraft must have to maintain a uniform flight path and recover from upsetting forces.
- **STATE** the warning every technician should be aware of before attempting a rig/range check.
- **STATE** the locations where rigging or range checks may not be performed.

### References

The information contained in this lesson can be found in the following references:

- DOT Airframe and Powerplant Mechanics Airframe Handbook, AC65-15A
- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)

1

5.B.15 Overview

# Introduction

The purpose of this assignment is to introduce you to the equipment and terminology used for rigging aircraft flight controls.

# In This Assignment

This assignment contains the following:

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Flight control surfaces should move a certain distance in either direction from the neutral position. These movements must be synchronized with the movement of the cockpit controls. The flight control system must be adjusted (rigged) to obtain these requirements.

# General Aircraft Rigging

General aircraft rigging consists of the following:

- Positioning the flight control system in neutral and temporarily locking it there with rig pins and blocks.
- Adjusting surface travel, system cable tension, linkages, and adjustable stops to specifications.

## Definition of Range Checks

Range checks are a verification that the flight controls are properly rigged. If ranges do not fall into place, then special inspections and actions must be taken to correct the problem(s).

# Definition of Rigging Checks

Rigging checks are performed to check the relative alignment and adjustment of an aircraft's main structural components, flight control surfaces, and flight control system. When rigging, follow specified maintenance publications for your aircraft type.

# Definition of Clearance Checks

Clearance checks are performed to check the relative alignment of the flight controls to the aircraft structural stops. If rigging is completed and stops do not make specified clearance checks, follow specified maintenance procedures in the applicable publications for your aircraft type.

Special equipment is used to perform rigging on aircraft. The purpose of the illustrations on the next several pages is to give you an idea of what some rigging equipment looks like. Some equipment is different for fixed-wing and rotary-wing aircraft.

# Rigging Equipment

There are too many types/pieces of equipment to be listed in this course, but in general the Coast Guard is currently using the following rigging equipment:

- Universal Propeller Protractor
- Tensiometer
- Vernier Scale
- Aircraft Rigging Kits
- Rigging Fixtures
- Scale

#### **NOTE**

Flight control rigging procedures are different for each aircraft type. Always refer to the applicable maintenance publications for specific procedures on your aircraft type.

Specific operating procedures for the flight control systems can be found in each aircraft's applicable maintenance manuals and maintenance procedure cards (MPC's).

Universal
Propeller
<b>Protractor</b>

The Universal Propeller Protractor is used to check angles and measure surface travel in degrees during performance of rig/range checks.

### Cable Tensiometer

The Cable Tensiometer is used to measure the installed tension of aircraft control cables.

### **Vernier Scale**

The Vernier Scale is used to check angles during performance of rig/range checks for the HH-65A.

# Illustration of a Vernier Scale

The Vernier Scale is described in the applicable maintenance manual. The maintenance manual explains how to properly use and read the scale when checking angles.

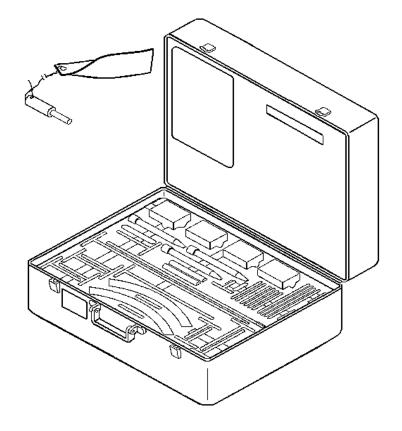


# Aircraft Rigging Kit

The Aircraft Rigging Kit is used to perform rig/range checks on rotor-wing aircraft. This kit contains various pins, blocks, shims to lock the flight controls to preset angles for measurement purposes.

# Illustration of an Aircraft Rigging Kit

The aircraft rigging kit is described in the applicable aircraft maintenance manual and MPC card. Use of the aircraft rigging kit is different for each type of aircraft, therefore the MPC thoroughly explains how to use it. The illustration below gives you a general idea of what the kit looks like.

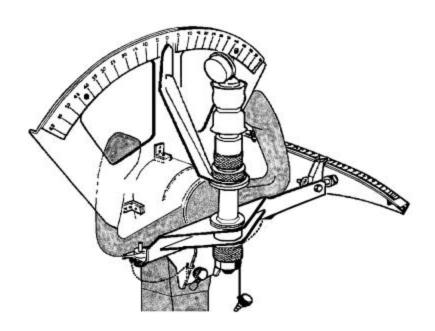


# **Rigging Fixtures**

Rigging Fixtures are used on all Coast Guard aircraft. Rigging fixtures are set to the aircraft manufacturer's standards.

# Illustration of a Rigging Fixture

The rigging fixture below is aircraft specific (HU-25). Use of the rigging fixture is explained in the aircraft MPC.



#### Scale

A Scale is used in measuring linear distance which requires minute measurements. A Scale may have measurements of one-sixteenth of an inch to one-hundredth of an inch.

# Illustration of a Scale

The Scale below is actually the back face of the scale. The forward face of the scale contains measurements of one-sixteenth of an inch to one-thirty-second of an inch.



In order for a fixed-wing flight control surface to function properly, it must be correctly adjusted. Correctly rigged flight control surfaces will move through a surface-throw and be synchronized with the movement of the cockpit controls.

# Standard Warning for Rigging

Before any work is performed on an aircraft for rigging discrepancies, follow the warning below:

### WARNING

Do not apply hydraulic power with the flight control system pinned or disconnected. Failure to follow maintenance procedures could cause injury to personnel and/or damage to flight control systems and equipment.

### Rigging of Fixed-Wing Flight Controls

Rigging any system requires that the step-by-step procedures be followed IAW the appropriate maintenance publications. Although the complete rigging procedure for most aircraft is of a detailed nature that requires several adjustments, the basic method follows three steps:

Step	Action	
1	Lock the cockpit control, bellcranks, and the control surfaces in the neutral position.	
2	Adjust the cable tension, maintaining the rudder, elevators, or ailerons in the neutral position.	
3	Adjust the control stops to limit the control surface travel to the dimensions given IAW maintenance publications for the aircraft being rigged.	

Rigging a rotor-wing aircraft (helicopter) coordinates movements of the flight controls and establishes the relationship between the main rotor and its controls and between the tail rotor and its controls.

### **Rigging Policy**

Strict adherence to rigging procedures IAW applicable maintenance publications is critical. Adjustments, clearances and tolerances must be exact. Rigging requires great precision and attention to the minute detail.

# Standard Warning for Rigging

Before any work is performed on an aircraft for rigging discrepancies, follow the warning below:

### **WARNING**

Do not apply hydraulic power with the flight control system pinned or disconnected. Failure to follow maintenance procedures could cause injury to personnel and/or damage flight control systems and equipment.

## Rigging of Rotor-Wing Flight Controls

Rigging of the flight control system can be broken down into several major steps:

Step	Action	
1	Place control system in a particular position; holding the control system in position with pins, blocks or clamps.	
2	Adjust the various linkages to fit the immobilized control component.	
3	Place control surfaces in a specific reference position.	
4	Use a rigging protractor assembly to check the angular difference between the control surface and some fixed surface on the aircraft.	
5	Set the maximum range of travel of the various components. (This adjustment limits the physical movement of the control system.)	

Aircraft rigging, as with any other maintenance performed on Coast Guard aircraft, must be annotated on the aircraft maintenance and/or history forms.

When to Document Rigging Discrepancies Before performing a rig/range task on a Coast Guard aircraft, ensure all maintenance started, in progress, and completed is written up in the appropriate aircraft maintenance forms.

### Requirements

Due to the critical nature of flight control rigging, several Maintenance Requirements need to be followed:

Step	Action		
1	Ensure rigging discrepancy is annotated on aircraft CG-4377 forms.		
2	Circle aircraft DOWN STATUS on aircraft CG-4377 forms.		
3	Ensure Maintenance Flight Safety Warning (red tag) is installed on cockpit controls before performing rigging/range checks.		
4	Upon completion of all maintenance, annotate aircraft CG-4377 forms describing ALL maintenance accomplished.		
5	Annotate appropriate functional check flight IAW COMDTINST M13020.1 (series).		
6	Make appropriate SIGNIFICIANT COMPONENT HISTORT REPORT entry describing any deviation required that changed rigging, which would prevent installing rigging tools or new rigging calculations.		
7	Record maintenance action by appropriate sign-off adding pertinent remarks.		

An aircraft must have sufficient stability to maintain a uniform flight path and be able to recover from various upsetting forces. Also, to achieve the best performance, the aircraft must have the proper response to the movement of its flight controls.

# General Warning for Rigging Discrepancies

Before performing any work on an aircraft for rigging discrepancies, follow the warning below:

### WARNING

Do not simply adjust flight controls to correct discrepancies in a rigging/range check. Investigate and correct the reasons for aircraft going out of rig, before adjusting flight controls.

# Rigging Principles

The following rigging principles must be observed:

- The rigging of flight controls and subsequent checks constitute a continuous sequence of operations which is very seldom carried out in full.
- Generally, only partial riggings or inspections are carried out in a defined operation which only affect the existing rigging.
- Rigging is required in case of removal/installation of the flight control system components.
- Flight control rigging consists of setting the flight controls into their relative positions to ensure a predetermined angle for each position of the flight control.

AMT2

When performing any work on an aircraft for rigging discrepancies and/or general operational checks for flight control component replacement, several guidelines should be followed.

### Warning

### WARNING

To prevent damage to aircraft, ensure the maintenance procedure card is followed step-by-step. Each step leads into another step, which is a sequence that must be followed to attain the correct results or measurements.

### Rigging Guidelines

The following guidelines should be observed:

- Rigging and other checks should not be performed outside of the maintenance hangar, unless Headquarters dictates it to be done in the open. If this cannot be avoided, the aircraft should be positioned with the nose in the wind.
- The weight and loading of the aircraft should be exactly as described in the aircraft log book. In all cases, the aircraft should not be jacked until it is ensured that the maximum jacking weight is not exceeded. Refer to COMDTINST M13020.1 (series).
- A rigging or range check should be completed before any work is performed on a flight control system. This will ensure you have a baseline, and will help you in deciding where to begin.
- When checking the range of movement of the flight control surface, the flight controls must be operated from the cockpit and not by moving the flight control surfaces.
- During the checking of flight control surface travel, ensure that push pull rods, cables, etc., have not reached limit of travel when the controls are against their respective stops.
- Where dual controls are installed, they must be synchronized and function satisfactorily when operated from both positions.
- When performing a rig/range check, the range of movement of the control surfaces should be checked in both directions.

# Rigging Guidelines (Continued)

- After a system has been adjusted, the full and synchronized movement of the controls should be checked.
- If the flight control system is rigged correctly and functions properly, thoroughly inspect the flight control system to determine system is correctly assembled and that it will operate freely over the specified range of movement.
- Ensure all turnbuckles, rod ends, and attaching nuts and bolts are correctly safety-wired and/or secured.

# Questions

	1)			
	2)			
	Mate lumn	• •	check	in column A with its definition in
	C	Column A		Column B
	1.	Clearance	a.	A verification that the flight controls as properly rigged.
	2.	Range	b.	Performed to check the relative alignment of the flight controls to the aircraft structural stops.
	3.	Rigging	c.	Performed to check the tips of rotor blades are on the same tip path plane throughout their entire cycle of rotation
			d.	Performed to check the relative alignment and adjustment of an aircraft's main structural components, flight control surfaces and flight control system.
3. What two rigging tools are used for checking angles?			re used for checking angles?	
4.		t rigging tool is aft control cab		to measure the installed tension of

Questions	
(Continued)	١

Name the kit used to perform rig/range checks on rotor-wing aircraft.
What tool used in aircraft rigging measures from a one-sixteer of an inch to a one-hundredth of an inch?
Write the warning concerning aircraft flight controls when hydraulic power is applied?
What location on the aircraft, should the Maintenance Flight Safety Warning (red tag) be installed before performing aircraft; rigging?
What is the Coast Guard publication that describes the appropriate functional check flight after aircraft rigging is performed?

Questions (Continued)	10. What must an aircraft have to maintain a uniform flight path and recover from various upsetting forces?
	11. Write the warning you should be aware of before attempting a rig/range check.
	12. Where should rigging or range checks not be performed?

# **Feedback**

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	Positioning the flight control system in neutral and temporarily locking it there with pins and blocks	3
	2) Adjusting surface travel, system cable tension, linkages, and adjustable stops to specifications	
2.	1) b	3
	2) a	
	3) d	
3.	Universal Propeller Protractor, Vernier Scale	5
4.	Cable Tensiometer	5
5.	Aircraft Rigging Kit	6
6.	Scale	7
7.	Do not apply hydraulic power with the flight control system pinned or disconnected. Failure to follow maintenance procedures could cause injury to personnel and/or damage to the flight control system and equipment	8

# Self-Quiz Feedback (Continued)

The following is a continuation of the Self-Quiz feedback.

Question	Answer	Reference
8.	Ensure Maintenance Flight Safety Warning (red tag) is installed on aircraft cockpit controls	10
9.	COMDTINST M13020.1 (series)	10
10.	Sufficient stability	11
11.	Investigate and correct the reasons for aircraft going out of rig, before adjusting flight controls.	11
12.	Should not be performed outside of the maintenance hangar, unless Headquarters dictates it to be done in the open	12

**Performance** RIG and ADJUST flight controls. Performance Given a flight control discrepancy and the necessary equipment, RIG flight controls IAW one or more of the following references: Objective 1 HH-65A • MPC Index, Chapter 67 **HH-60J** • MPC Index, Chapters 55 and 67 HC-130H • MPC Index, Chapter 27 **HU-25A** • MPC Index, Chapter 27 Performance Given a flight control discrepancy and the necessary equipment, **Objective 2** ADJUST flight controls IAW one or more of the following references: **HH-65A** MPC Index, Chapter 67 HH-60.I MPC Index, Chapters 55 and 67 HC-130H MPC Index, Chapter 27 **HU-25A** MPC Index, Chapter 27

**Syllabus** 

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Syllabus 5.B.16

#### **Performance**

TROUBLESHOOT engine electrical/electronic control systems discrepancies.

# Performance Objective 1

Given an aircraft engine electrical/electronic control system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

Performance Objective 2

Given an aircraft engine electrical/electronic control system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 73 and 76
- MPC Index, Chapters 73 and 76

**HH-60J** 

- A1-H60CA-220-200
- A1-H60HA-510-200
- A1-T700A-MMI-210

HC-130H

- 1C-130H-2-71JG-00-2
- 1C-130H-2-73JG-00-2
- 2J-T56-56
- MPC Index, Chapter 73

HU-25A

- 1U-25A-2, Chapters 71 and 73
- 2J-ATF3-2-1
- MPC Index, Chapters 71, 72, and 73

Given an aircraft engine electrical/electronic control system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

# Performance Objective 4

Given an aircraft engine electrical/electronic control system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapters 73 and 76
- 1H-65A-2-2, Chapters 73 and 76
- 1H-65A-4, Chapters 73 and 76
- MPC Index, Chapters 73 and 76

**HH-60J** 

- A1-H60CA-220-200
- A1-H60CA-220-400
- A1-H60HA-510-200
- A1-H60HA-510-400

# Performance Objective 4 (Continued)

#### HC-130H

- 1C-130H-2-70FI-00-1-1
- 1C-130H-2-70FI-00-1-2
- 1C-130H-2-71JG-00-2
- 1C-130H-2-73JG-00-2
- 1C-130H-2-13, Section 4
- 1C-130H-4
- 2J-T56-56
- MPC Index, Chapters 73 and 76

### **HU-25A**

- 1U-25A-2, Chapters 71 and 73
- 1U-25A-2-9, Chapter 73
- 1U-25A-4
- 2J-ATF3-2-1
- MPC Index, Chapters 71, 72, and 73

Given an aircraft engine electrical/electronic control system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapters 73 and 76
- 1H-65A-2-2, Chapters 73 and 76
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 73 and 76

#### **HH-60J**

- A1-H60CA-220-300
- A1-H60HA-510-300
- A1-T700A-MMI-210
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 73 and 76

### HC-130H

- 1C-130H-2-71JG-00-2
- 1C-130H-2-73JG-00-2
- 1C-130H-2-80JG-00-1
- 2J-T56-56
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 73 and 76

#### **HU-25A**

- 1U-25A-2, Chapters 71 and 73
- 2J-ATF3-2-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 71, 72, and 73

Given an aircraft engine electrical/electronic control system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А	
• 1H-65A-2-1, Chapters 73 and 76	
• MPC Index, Chapters 73 and 76	
НН-60Ј	
• A1-H60CA-220-200	
• A1-H60HA-510-200	
• MPC Index, Chapter 72	
НС-130Н	
• 1C-130H-2-71JG-00-2	
• 1C-130H-2-73JG-00-2	
• 2J-T56-56	
• MPC Index, Chapter 73	
HU-25A	
• 1U-25A-2, Chapters 71 and 73	
• 2J-ATF3-2-1	
• MPC Index, Chapters 71, 72, and 73	

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**Syllabus** 5.B.17 **Performance** TROUBLESHOOT aircraft engine anti-ice/de-ice system discrepancies to the component/wire level. **Performance** Given an aircraft engine anti-ice/de-ice system discrepancy and **Objective 1** General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Performance Given an aircraft engine anti-ice/de-ice system discrepancy and **Objective 2** necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H 65A-2-1, Chapters 71 and 76 • MPC Index, Chapters 30 and 75 **HH-60J** • A1-H60CA-220-200 • A1-H60HA-410-200 • A1-T700A-MMI-200, Chapter 17 • MPC Index, Chapters 30 and 75 HC-130H

• 1C-130H-2-30JG-00-1

• 1C-130H-2-71JG-00-1

• 1U-25A-2, Chapter 30

• MPC Index, Chapter 30

1

HU-25A

Given an aircraft engine anti-ice/de-ice system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

\_\_\_\_\_

# Performance Objective 4

Given an aircraft engine anti-ice/de-ice system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

\_\_\_\_\_

- 1H 65A-2-1, Chapters 71 and 76
- 1H-65A-11-72-2B2, Chapter 75

**HH-60J** 

\_\_\_\_\_

- A1-H60CA-220-100
- A1-H60CA-220-400
- A1-H60HA-410-200
- A1-H60HA-410-400
- A1-H60JA-WDM-000
- A1-T700A-MMI-210
- A1-T700A-IPB-400

# Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-30FI-00-1-1
- 1C-130H-2-30FI-00-1-2
- 1C-130H-2-30JG-00-1
- 1C-130H-2-75JG-00-1
- 1C-130H-4
- MPC Index, Chapter 75

### **HU-25A**

- 1U-25A-2, Chapter 30
- 1U-25A-2-9, Chapters 30 and 71
- 1U-25A-4
- MPC Index, Chapter 30

Given an aircraft engine anti-ice/de-ice system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H 65A-2-1, Chapters 71 and 76
- 1H 65A-11-72-2B2, Chapter 75
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 30 and 75

#### **HH-60J**

- A1-H60CA-220-200
- A1-H60CA-220-300
- A1-H60HA-410-200
- A1-H60HA-410-300
- A1-T700A-MMI-200
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapters 30 and 75

#### HC-130H

- 1C-130H-2-30JG-00-1
- 1C-130H-2-75JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 75

#### **HU-25A**

- 1U-25A-2, Chapter 30
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

Given an aircraft engine anti-ice/de-ice system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

НН-65А	
• 1H 65A-2-1, Chapters 71 and 76	
• MPC Index, Chapters 30 and 75	
НН-60Ј	
• A1-H60CA-220-200	
• A1-H60HA-410-200	
• A1-T700A-MMI-200, Chapter 17	
• MPC Index, Chapters 30 and 75	
НС-130Н	
• 1C-130H-2-30JG-00-1	
• 1C-130H-2-71JG-00-1	
HU-25A	
• 1U-25A-2, Chapter 30	
• MPC Index, Chapter 30	

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**Syllabus** 5.B.18 **Performance** TROUBLESHOOT aircraft windscreen anti-ice/de-ice system discrepancies to the component/wire level. Performance Given an aircraft windscreen anti-ice/de-ice system discrepancy and **Objective 1** General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Performance Given an aircraft windscreen anti-ice/de-ice system discrepancy and **Objective 2** necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 30 • MPC Index, Chapter 30 **HH-60J** • A1-H60HA-410-200 • MPC Index, Chapter 30 HC-130H • 1C-130H-2-30JG-00-1

HU-25A

• 1U-25A-2, Chapter 30

1

Given an aircraft windscreen anti-ice/de-ice system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

# HH-65A • 1H-65A-2-1, Chapter 30 • 1H-65A-2-2, Chapter 30 • 1H-65A-4, Chapter 30 • MPC Index, Chapter 30 **HH-60J** • A1-H60HA-410-100 • A1-H60HA-410-400 • A1-H60JA-WDM-000 • MPC Index, Chapter 30 HC-130H • 1C-130H-2-30FI-00-1-1 • 1C-130H-2-30JG-00-1 • 1C-130H-2-13, Section 10 • 1C-130H-4 • MPC Index, Chapter 30 HU-25A • 1U-25A-2, Chapter 30 • 1U-25A-2-9, Chapter 30 • 1U-25A-4 • MPC Index, Chapter 30

Given an aircraft windscreen anti-ice/de-ice system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### HH-65A

- 1H-65A-2-1, Chapter 30
- 1H-65A-2-2, Chapter 30
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

#### **HH-60J**

- A1-H60HA-410-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

### HC-130H

- 1C-130H-2-30JG-00-1
- 1C-130H-2-56JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

### **HU-25A**

- 1U-25A-2, Chapter 30
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 30

Given an aircraft windscreen anti-ice/de-ice system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

H	H-65A	
•	1H-65A-2-1, Chapter 30	
•	MPC Index, Chapter 30	
HI	H-60J	
•	A1-H60HA-410-200	
•	MPC Index, Chapter 30	
H	С-130Н	
•	1C-130H-2-30JG-00-1	
H	U-25A	<i>P</i>
•	1U-25A-2, Chapter 30	

Syllabus	5.B.19
Performance	TROUBLESHOOT aircraft oxygen system discrepancies.
Performance Objective 1	Given an aircraft oxygen system discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).
Performance Objective 2	Given an aircraft oxygen system discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system IAW one or more of the following references:
	HH-65A
	• This system/equipment not used on this aircraft
	• Refer to the COMDTINST M1414.8, Chapter 2
	НН-60Ј
	• This system/equipment not used on this aircraft
	• Refer to the COMDTINST M1414.8, Chapter 2
	НС-130Н
	• 1C-130H-2-35JG-00-1
	• MPC Index, Chapter 35
	HU-25A
	• 1U-25A-2, Chapter 35

# Performance Objective 3

Given an aircraft oxygen system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component IAW one or more of the following references:

### **HH-65A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### HC-130H

- 1C-130H-2-35FI-00-1
- 1C-130H-2-35GS-00-1
- 1C-130H-2-35JG-00-1
- 1C-130H-4
- MPC Index, Chapter 35

#### **HU-25A**

- 1U-25A-2, Chapter 35
- 1U-25A-4
- MPC Index, Chapter 35

# Performance Objective 4

Given an aircraft oxygen system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

### **HH-65A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### HC-130H

- 1C-130H-2-35JG-00-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 35

### **HU-25A**

- 1U-25A-2, Chapter 35
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 35

# **Performance** Objective 5

Given an aircraft oxygen system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

### HH-65A

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

HC-130H	
1C-130H-2-35IG-00-1	

- MPC Index, Chapter 35

### HU-25A

• 1U-25A-2, Chapter 35

### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **IDENTIFY** the manual used for compressed gas cylinder handling.
- **STATE** the identification criteria of a compressed gas cylinder which contains Aviation Breathing Oxygen.
- STATE the Oxygen Servicing Guidelines Warning.
- **DEFINE** the term asphyxia.
- **STATE** the identification criteria of a compressed gas cylinder which contains nitrogen.
- MATCH a list of definitions with a list of compressed gases.
- **MATCH** the components of a nitrogen pressure regulator to its function.
- **LIST** the nitrogen pressure regulators basic pre-use inspection guidelines.
- MATCH the components of a refrigeration manifold to its function.

#### References

The information contained in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Gas Cylinders (Storage Type) Use, Handling, and Maintenance, AFTO 42B5-1-2
- DOT Airframe and Powerplant Mechanics Airframe Handbook, AC65-15A

5.B.20 Overview

### Introduction

The purpose of this assignment is to introduce you to the safety concerns in the handling and operation of gaseous oxygen, nitrogen, and R-12 and 134A refrigerant servicing systems. This assignment will also give you an understanding of basic servicing principles of these systems.

# In This Assignment

This assignment contains the following:

Subject	Page
Compressed Gas Systems	3
Compressed Gas Cylinder Handling	4
Oxygen	5
Oxygen Handling Guidelines	6
Nitrogen	7
Nitrogen Pressure Regulator	8
Refrigerant-12 (R-12)	10
Parts of a R-12 Refrigerant Manifold and Gage	12
Refrigerant -134a (R-134a)	14
Compressed Gas Use and Safety Self-Quiz	15
Compressed Gas Use and Safety Self-Quiz Feedback	20
Syllabus	23

### **Compressed Gas**

There are four major compressed gas systems used in Coast Guard aviation today. They are as follows:

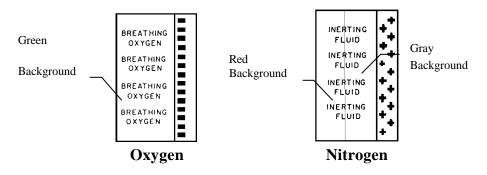
#### NOTE

Technicians should refer to a compressed gas by its proper name to avoid confusion on the hanger deck.

- Oxygen
- Nitrogen
- Refrigerant-12 (R-12)
- Refrigerant-134a (R-134a)

# Compressed Gas Line Identification

Servicing connections and lines for compressed gas system on the aircraft are identified by colored tape known as Line Identification Tape. This tape is a multi-colored, self-adhesive tape with geometric symbols located on the side. The identification tape is required on both ends of a line or tube and at least once in each compartment the line passes through. The following is an example of oxygen and nitrogen labels.



#### Introduction

Gas cylinders require special handling due to their heavy weight, odd shape, and the fact that they are under high pressure. Cylinders are literally missiles waiting to go off; just waiting for the wrong careless moment of rough handling to release its high pressure. The best safety measure is to ensure that you, the cylinder handler, are adequately trained and that you follow both the manufacturers and the ACMS MPC.

### Compressed Gas Handling Guidelines

There are some general compressed gas cylinder handling guidelines. However, it should not be assumed that every safety precaution is contained in this section. The primary manual used for compressed gas handling guidelines in Coast Guard aviation is AFTO 42B5-1-2; Gas Cylinders (Storage Type) Use, Handling, and Maintenance Manual. Below is a list of some basic guidelines.

- Read and understand the Material Safety Data Sheet (MSDS) for the compressed gas prior to use.
- Never drag or roll a cylinder.
- Never move cylinders, without first removing the regulator and manifold accessories and replacing the valve cap.
- When moving cylinders always use an approved cylinder truck with provisions to hold the cylinder securely.
- Never place a cylinder where it might come in contact with electrical circuits or store cylinders near live wires.
- Valve caps shall always be installed except when cylinders are connected to equipment.
- Never use compressed gas to dust off clothing.
- Never subject compressed gas cylinders to temperatures above 130?F.
- A distance of 50 feet or greater shall be maintained between cylinders and combustible material.
- When doing leak checks use only approved leak detection fluid (see ACMS MPC).

Oxygen 5.B.20

# Definition of Oxygen

Oxygen is a colorless, odorless, and tasteless gas that makes up only 21% of the atmosphere. While oxygen itself is nonflammable, it gives intensive support to combustion.

#### **Definition of Air**

Air is a mixture of various elements consisting of oxygen (21%), nitrogen (78%), and other inert gases(1%). This total combination is known as air and shall be called air.

# Oxygen Identification

The cylinder is green in color and has a white colored band painted around the circumference. The gaseous oxygen used in the Coast Guard is MIL-O-27214 Type I Grade B, Aviators Breathing Oxygen (ABO).

# Oxygen Quality Requirement

The quality of oxygen that is used in aviation is very important. In aviation we use only 99.5% pure oxygen known as Aviators Breathing Oxygen (ABO) Type I, Grade B, MIL-O-27214. The reason for this strict compliance is to ensure that there is no water in the system which, at a high altitude or low temperatures, would cause the system to fail by freezing up.

# Oxygen Safety Concerns

Oxygen safety is a major concern in the aviation maintenance field and care shall be exercised around gaseous oxygen at all times. The chemical reaction of fuel, gases, or oil combined with compressed oxygen is sufficient to develop spontaneous combustion, (requires no spark or flame) causing an explosion.

# Oxygen Safety Guidelines

Avoid all contact with any products that contain hydrogen, oils, and greases such as:

- Petroleum products (engine oils, grease, petroleum based hand lotions, oil or grease on tools, etc.)
- Organic greases and oils (chap stick, vegetable oils, animal fats, chicken grease from your box lunch etc.)
- Synthetic distillates (hydraulic fluids, lubricating sprays)
- Hand tools, and maintenance equipment *shall* be clean and free from oil and grease before using oxygen equipment.

# Oxygen Handling Guidelines

Below is a list of some basic oxygen servicing guidelines IAW the M13020.1 (series):

### WARNING

During actual servicing the technician **SHALL** follow the ACMS MPC or aircraft maintenance publications to ascertain the proper equipment and servicing requirements needed for the specific aircraft being serviced.

- Never use oxygen from a cylinder without reducing the pressure through an oxygen regulator.
- Ground the aircraft to an approved ground prior to connecting oxygen servicing lines to aircraft.
- Before attempting to connect oxygen cylinders to aircraft systems *ensure* that each cylinder is correctly identified by a white band around the green cylinder or the words "Aviators Breathing Oxygen," painted on the side of the cylinder.
- Never deplete an oxygen bottle below 50 psi.
- Release all pressure from the lines before tightening or loosening any oxygen tubing or lines.
- Aircraft shall not be serviced with oxygen during fueling, defueling, or while other maintenance is being accomplished.
- Aircraft will not be serviced while in the hanger.
- When doing leak checks use only approved leak detection fluid (see ACMS MPC).

Nitrogen 5.B.20

# Definition of Nitrogen

Nitrogen is an inert gas. (Inert being defined as chemically inactive; not combining with other chemicals) and will not cause rust or decay of most things it comes into contact with. Nitrogen does not support combustion or life and is classified as an asphyxiant.

# Definition of an Asphyxiant

An Asphyxiant is any chemical that causes asphyxia. Asphyxia is the deficiency of oxygen and excess build up of carbon dioxide in the blood, which can lead to unconsciousness or death.

# Nitrogen Cylinder Identification

The gaseous nitrogen used in the Coast Guard follows these criteria:

- Cylinders are colored gray and have two black colored bands painted around the circumference.
- Must meet FED-SPEC-BB-N-411.
- Class I is an *oil free* nitrogen which means that it has been pumped into the cylinders by a water lubricated pump.

### **Uses of Nitrogen**

Nitrogen, due to its inert and non corrosive characteristics, is used in many applications on aircraft such as:

- Tires
- Pneumatic struts
- Accumulators
- Landing gear emergency blow down bottles

# Nitrogen Safety Guidelines

Below are some basic safety and handling guidelines that should be followed IAW NAVAIR 00-80T-96:

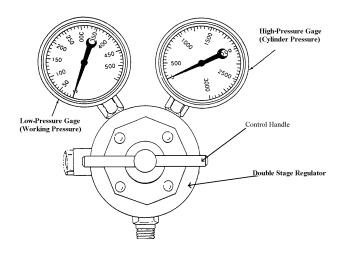
- Always use nitrogen in a well ventilated area or use supplemental breathing equipment.
- Never use nitrogen from a cylinder without reducing the pressure through a regulator.
- Do not use nitrogen carts for a source of pressure to run pneumatic tools. The tools can explode.

Nitrogen Pressure Regulator Function The nitrogen pressure regulator reduces and controls the pressure from the bottle or the servicing cart to the servicing connection. The nitrogen pressure regulator has three major parts.

Nitrogen Pressure Regulator Parts Function Table Below is a diagram listing the parts and the functions of a typical nitrogen pressure regulator and gage set.

Part	Function
High-Pressure Gage (Cylinder Pressure)	Indicates, in pounds per square inch (psi), the pressure of the gas in the cylinder.
Low-Pressure Gage (Working Pressure)	Indicates the pressure in the hose or line from the regulator to the servicing connection.
Double Stage Regulator and Control Handle	Provides the means for controlling the gas from the cylinder or servicing unit to the unit being serviced.

Nitrogen Pressure Regulator Diagram Below is a view of a typical compressed nitrogen gas cylinder pressure regulator with gages.



### Basic Nitrogen Pressure Regulator/Gages

The nitrogen pressure regulator/gages have a basic pre-use inspection. Before using the pressure regulator/gages the technician should do the following inspection. This will ensure that the pressure regulator/gage are reasonably safe to use. The pressure regulator/gages are highly accurate and delicate instruments and should be handled with care.

# Pre-Use Inspection Guidelines

Listed below are some of the more common and basic pre-use inspection guidelines.

- Gages are intact (no loose lenses).
- Gages are within calibration date.
- Gages are reading zero (not low or just above).
- Gages show no signs of damage (dents on the casing etc.)
- Regulator control handle moves freely with no roughness or binding.
- Regulators show no sign of corrosion.
- Regulators show no signs of leakage.
- Read the manual from the manufacturer or the applicable technical order.

### **R-12 Description**

R-12 (DICHLORODIFLUOROMETHANE) is a fluorinated hydrocarbon refrigerant that is colorless, odorless, and non toxic. R-12 being heavier than air is also classified as an asphyxiant. R-12 boils at the low temperature of -26.6 F at sea level. Because of this, R-12, will cause immediate frostbite when exposed to any living tissue. R-12 is an ozone depleting chemical and is being replaced by R-134a.

# R-12 Cylinder Identification

The R-12 refrigerant used in Coast Guard aviation comes in a 30-pound metal (BIB) tank and has no standard color coding.

# R-12 Safety Guidelines

The following safety guidelines should be applied prior to and while using the R-12 refrigerant.

### WARNING

Do not cross contaminate R-12 with R-134a system or its equipment. R-12 is not compatible with R-134a.

- Read and understand the Material Safety Data Sheet (MSDS) prior to use.
- Read and understand all ACMS MPC operating procedures of the servicing unit that your using.
- Always wear safety goggles (preferably a face shield).
- Always wear heavy work gloves.
- Ensure proper ventilation is maintained
- Ensure all aircraft power is secured.
- Ensure the pressure is released in the hose and tubing lines prior to making and breaking connections.
- When doing leak checks use only approved leak detection fluid (refer to the appropriate ACMS MPC).

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# R-12 Refrigerant Manifold and Gage

The R-12 refrigerant manifold and gage normally come as a combined set as shown below. This set up is made for the maintenance and servicing of refrigerants only and should not be used with any other types of compressed gas set ups.

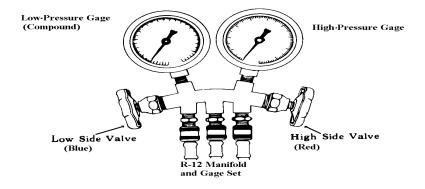
### Manifold and Gage Parts Function Table

Below is a diagram listing the parts and function of the R-12 refrigerant manifold and gage set.

Parts	Function
Low-Pressure Gage (compound gage)	Reads low pressure or vacuum on either side of atmospheric pressure, 30 inches of mercury below atmospheric to 60 psi above atmospheric pressure.
High-Pressure Gage	Reads high-side pressure from 0 to 600 psi.
Refrigerant Manifold	Consists of three fittings used to connect the hoses and two colored hand valves.
Low-Pressure Side Valve (Blue)	Controls low pressure and vacuum (low side).
High-Pressure Side Valve (Red)	Controls high pressure (High side).

## R-12 Refrigerant Manifold and Gage Diagram

Below is a diagram of a R-12 refrigerant manifold and gage set.



### R-12 Manifold and Gage Set Handling Guidelines

The R-12 manifold and gage set is a highly accurate and delicate instrument. Before using the manifold and gage set, ensure the guidelines listed below are followed:

- Avoid dropping and mishandling the set.
- Always cap the lines after removing them from the refrigerant system (this avoids contaminating the gages and other refrigeration units).
- Ensure gages are within calibration date.
- Ensure gages show no sign of damage (dents on the casing, cracked lens, etc.).
- Ensure hoses are in good repair.
- Ensure valves move freely and shows no signs of binding.
- Never over tighten valves in the closed position.

### R-134a Description

R-134a (tetraflouroethane) GENETRON® is a clear, colorless liquid, and at ambient temperatures is non-flammable. R-134a has a faint ethereal and sweetish odor and boils at the low temperature of -15?F at sea level. If R-134a is exposed to any living tissue, it will cause immediate frostbite. R-134a is heavier than air and is classified as an asphyxiant. Although R-134a is not an ozone depleting product, it is a greenhouse gas which contributes to global warming.

# R-134a Cylinder Identification

The R-134a refrigerant that is used in Coast Guard aviation comes in a 30-pound metal (BIB) tank with no standard color coding.

### R-134a Safety Guidelines

The following safety guidelines should be applied prior to and while using the R-134a refrigerant.

### **WARNING**

Do not cross contaminate R-134a with a R-12 system or its equipment. R-134a is not compatible with R-12.

- The safety guidelines for R-134a are the same as previously stated for R-12.
- To prevent cross contamination, R-134a hoses have special end fittings on them. They are not to be modified to accept any other gas or hose assemblies.

# R-134a Pressure Regulator

The R-134a pressure regulator is a part of the ROBINAIR 34700 servicing unit. Each operation is explained in the applicable ACMS MPC.

# Questions

Fill in the correct answers for the following Compressed Gas Use and Safety questions.

l.	What manual is used in Coast Guard aviation for compressed gas cylinder handling guidelines?
2.	The Aviators Breathing Oxygen compressed gas cylinder is identified by what color scheme?
3.	During actual aircraft oxygen servicing, the technician shall follow theor
١.	The term asphyxia means:
5.	The nitrogen compressed gas cylinder is identified by what color
	scheme?
	Continued next page

# Questions (Continued)

6. Column A lists the definitions of various compressed gases. Column B lists the names of compressed gases. Look at the definitions of each compressed gas and match the correct definition to its name. You may use the names more than once.

Column A	<u>Column B</u>
1. Is a non-ozone depleting	a. Nitrogen
product, but is a greenhouse gas.	b. R-12
2. Is non-flammable, but	c. R-134a
will support combustion.	d. Oxygen
3. Makes up 21% of the	e. Air
atmosphere.	f. Argon
4. Is defined as chemically inert.	g. Carbon Dioxide
5. Is a combination of oxygen, nitrogen, and other gases.	

# Questions (Continued)

7. Match each nitrogen pressure regulator component listed in column A with its purpose from column B. Use each letter only once.

Column A		Column B
1. Low-Pressure Gage	a.	Provides a means for controlling the gas from the cylinder or servicing unit.
2. High-Pressure Gage3. Double Stage Regulator	b.	Indicates in pounds per square inch (psi), the pressure of the gas in the cylinder.
	c.	Indicates the pressure in the hose or line from the regulator to the servicing connection.
	d.	Reads the compressed gas cylinders vacuum in inches of mercury (hg).

# 5.B.20 Compressed Gas Use and Safety Self-Quiz (Continued)

Questions
(continued)

8.	List the nitrogen pressure regulator/gages pre-use inspective guidelines in any order.	ction
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		

# Questions (Continued)

9. Match each Refrigerant Manifold and Gage component listed in column A with its purpose in column B. Use each letter only once.

Column A		Column B
1. Low-Pressure Side Valve	a.	Reads pressure from 0-600 psi.
2. Low-Pressure Gage (compound)	b.	Reads low pressure or vacuum.
	c.	Controls low pressure.
3. High-Pressure Gage	d.	Controls high pressure.
4. High-Pressure Side Valve	e.	Reads bottle weight.

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# Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answer	Reference
1.	AFTO 42B5-1-2; Gas Cylinders (Storage Type) Use, and Handling, and Maintenance Manual	4
2.	Cylinders are colored green and have one white band around the circumference.	5
3.	ACMS MPC, aircraft maintenance publications	6
4.	Is the deficiency of oxygen and excess build up of carbon dioxide in the blood.	7
5.	Cylinders are colored gray and have two black bands around the circumference.	7
6.	1. c 2. d 3. d 4. a 5. e	13 5 5 7 5

# Feedback (Continued)

This is a continuation of the feedback table on the preceding page.

Questions	Answers	Reference
7.	1. c 2. b 3. a	8
8.	a. Gages are within calibration date	9
	b. Gages are intact (no lose lens)	
	c. Gages are reading zero	
	d. Gages show no signs of damage	
	e. Regulator control handle moves freely with no roughness or binding	
	f. Regulators show no signs of corrosion	
	g. Regulators show no sign of leakage	
	h. Inspect hoses/lines for damage	
	i. Read and use the inspection manual from the manufacture or the applicable technical order	
9.	1. c 2. b 3. a 4. d	12

Syllabus 5.B.20

### **Performance**

SERVICE aircraft oxygen system.

# Performance Objective

Given an aircraft oxygen system and necessary equipment, **SERVICE** the applicable system IAW one or more of the following references:

#### HH-65A

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

#### **HH-60J**

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

### HC-130H

- COMDTINST M13520.1
- 1C-130H-2-12JG-10-2
- MPC Index, Chapter 35

#### **HU-25A**

- COMDTINST M13520.1
- 1U-25A-2, Chapters 12, 20, and 35
- MPC Index, Chapter 35

5.B.20 Blank Page

**Syllabus** 5.B.21 Performance TROUBLESHOOT aircraft fire extinguisher system discrepancies to the component/wire level. Performance Given an aircraft fire extinguisher system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Performance Given an aircraft fire extinguisher system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 26 • MPC Index, Chapter 26 **HH-60J** • A1-H60CA-490-200 • MPC Index, Chapter 26 HC-130H • 1C-130H-2-26JG-20-1

• MPC Index, Chapter 26

• 1U-25A-2, Chapter 26

1

**HU-25A** 

# Performance Objective 3

Given an aircraft fire extinguisher system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

# Performance Objective 4

Given an aircraft fire extinguisher system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- 1H-65A-4, Chapter 26
- MPC Index, Chapter 26

**HH-60J** 

- A1-H60CA-490-100
- A1-H60CA-490-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 26

# Performance Objective 4 (Continued)

### HC-130H

- 1C-130H-2-26FI-00-1
- 1C-130H-2-26GS-00-1
- 1C-130H-2-26JG-20-1
- 1C-130H-2-13, Section 4
- 1C-130H-4
- MPC Index, Chapter 26

### HU-25A

- 1U-25A-2, Chapter 26
- 1U-25A-2-9, Chapter 26
- 1U-25A-4
- MPC Index, Chapter 26

# Performance Objective 5

Given an aircraft fire extinguisher system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

#### **HH-60J**

- A1-H60CA-490-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

### HC-130H

- 1C-130H-2-26JG-20-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

### **HU-25A**

- 1U-25A-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

Continued next page

# Performance Objective 6

Given an aircraft fire extinguisher system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

HH-65A	
• 1H-65A-2-1, Chapter 26	
• MPC Index, Chapter 26	
нн-60Ј	
• A1-H60CA-490-200	
• MPC Index, Chapter 26	
НС-130Н	
• 1C-130H-2-26JG-20-1	
• MPC Index, Chapter 26	
HU-25A	
• 1U-25A-2, Chapter 26	

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**Syllabus** 5.B.22 Performance TROUBLESHOOT aircraft fire detection system discrepancies to the component/wire level. Performance Given an aircraft fire detection system discrepancy and General **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Performance Given an aircraft fire detection system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 26 • MPC Index, Chapter 26 **HH-60J** • A1-H60CA-490-200 • MPC Index, Chapter 26 HC-130H

• 1C-130H-2-26JG-10-1

• 1U-25A-2, Chapter 26

1

**HU-25A** 

# Performance Objective 3

Given an aircraft fire detection system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Procedures (section 5.B.GTG).

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# Performance Objective 4

Given an aircraft fire detection system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- 1H-65A-4, Chapter 26
- MPC Index, Chapter 26

**HH-60J** 

- A1-H60CA-490-100
- A1-H60CA-490-400
- A1-H60JA-WDM-000
- MPC index, Chapter 26

### Performance Objective 4 (Continued)

#### HC-130H

- 1C-130H-2-26FI-00-1
- 1C-130H-2-26GS-00-1
- 1C-130H-2-13, Section 4
- 1C-130H-4
- MPC Index, Chapter 26

#### **HU-25A**

- 1U-25A-2, Chapter 26
- 1U-25A-2-9, Chapter 26
- 1U-25A-4
- MPC Index, Chapter 26

Given an aircraft fire detection system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 26
- 1H-65A-2-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

#### **HH-60J**

- A1-H60CA-490-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

#### HC-130H

- 1C-130H-2-26JG-10-1
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

#### **HU-25A**

- 1U-25A-2, Chapter 26
- AFTO 1-1A-14 (NAVAIR 01-1A-505)
- MPC Index, Chapter 26

Given an aircraft fire detection system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

H	HH-65A		
•	1H-65A-2-1, Chapter 26		
•	MPC Index, Chapter 26		
H	H-60J		
•	A1-H60CA-490-200		
•	MPC Index, Chapter 26		
H	С-130Н		
•	1C-130H-2-26JG-10-1		
H	IU-25A		
•	1U-25A-2, Chapter 26		

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Syllabus 5.B.23

### Performance

REPLACE cartridges and cartridge-activated devices.

### Performance Objective

Given a cartridge or a cartridge-activated device discrepancy and necessary equipment, **REPLACE** the applicable component IAW one or more of the following references:

HH-65A

- NAVAIR 11-100-1 (series)
- MPC Index, Chapters 25, 26, and 40

**HH-60J** 

- A1-H60CA-GAI-000
- A1-H60CA-490-300
- A1-H60HA-110-300
- A1-H60HA-750-300
- NAVAIR 11-100-1 (series)
- MPC Index, Chapters 25, 26, 40, and 85

HC-130H

- 1C-130H-2-26JG-20-1
- NAVAIR 11-100-1 (series)
- MPC Index, Chapter 26

HU-25A

- 1U-25A-2, Chapter 26
- NAVAIR 11-100-1 (series)

1

• MPC Index, Chapter 26

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**Syllabus** 5.B.24 Performance TROUBLESHOOT aircraft flotation system discrepancies to the component/wire level. Given an aircraft flotation system discrepancy and General Performance **Objective 1** Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG). Performance Given an aircraft flotation system discrepancy and necessary **Objective 2** equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references: HH-65A • 1H-65A-2-1, Chapter 25 • MPC Index, Chapter 25 **HH-60J** • A1-H60CA-140-200 • A1-H60HA-560-200 • MPC Index, Chapters 22 and 67 HC-130H • This system/equipment not used on this aircraft • Refer to the COMDTINST M1414.8, Chapter 2

• This system/equipment not used on this aircraft

• Refer to the COMDTINST M1414.8, Chapter 2

Continued next page

**HU-25A** 

Given an aircraft flotation system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft flotation system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 25
- 1H-65A-2-2, Chapter 25
- 1H-65A-4, Chapter 25
- MPC Index, Chapter 25

#### **HH-60J**

- A1-H60HA-140-100
- A1-H60HA-140-400
- A1-H60HA-560-100
- A1-H60HA-560-400
- A1-H60JA-WDM-000
- MPC Index, Chapters 22 and 67

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft flotation system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### **HH-65A**

- 1H-65A-2-1, Chapter 25
- 1H-65A-2-2, Chapter 25
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 25

#### **HH-60J**

- A1-H60HA-140-300
- A1-H60HA-560-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 22 and 67

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft flotation system and necessary equipment, **PERFORM** an operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 25
- MPC Index, Chapter 25

#### **HH-60J**

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Syllabus 5.B.25

#### Performance

SERVICE aircraft flotation system.

# Performance Objective

Given an aircraft flotation system and necessary equipment, **SERVICE** the system IAW one or more of the following references:

HH-65A

• MPC Index, Chapter 25

**HH-60J** 

• A1-H60CA-GAI-000

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

#### HU-25A

- This system/equipment not used on this aircraft
- Refer to COMDTINST M1414.8, Chapter 2

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Syllabus 5.B.26

#### **Performance**

TROUBLESHOOT aircraft hoist system discrepancies to the component/wire level.

# Performance Objective 1

Given an aircraft hoist system discrepancy and General Troubleshooting Guidelines, **PERFORM** a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).

\_\_\_\_\_

# Performance Objective 2

Given an aircraft hoist system discrepancy and necessary equipment, **PERFORM** an operational check of the applicable system IAW one or more of the following references:

HH-65A

- 1H-65A-2-1, Chapter 40
- MPC Index, Chapter 40

HH-60J

\_\_\_\_\_

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

1

Given an aircraft hoist system discrepancy and your findings from the previous operational check, **CLASSIFY** (orally) the discrepancy as a mechanical or electrical malfunction IAW the General Troubleshooting Guidelines (section 5.B.GTG).

### Performance Objective 4

Given an aircraft hoist system discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the malfunction to the most probable component/wire IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 40
- 1H-65A-2-2, Chapter 40
- 1H-65A-4, Chapter 40
- MPC Index, Chapter 40

#### **HH-60J**

- A1-H60HA-140-400
- A1-H60HA-560-400
- A1-H60JA-WDM-000
- MPC Index, Chapter 40

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft hoist system discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 40
- 1H-65A-2-2, Chapter 40
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapter 40

#### **HH-60J**

- A1-H60HA-140-300
- A1-H60HA-560-300
- A1-H60CA-WCR-000
- AFTO 1-1A-14 (NAVAIR 01-14-505)
- MPC Index, Chapters 22 and 67

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Given an aircraft hoist system and necessary equipment, **PERFORM** a final operational check of the applicable system to verify the discrepancy has been corrected IAW one or more of the following references:

#### HH-65A

- 1H-65A-2-1, Chapter 40
- MPC Index, Chapter 40

#### HH-60J

- A1-H60CA-140-200
- A1-H60HA-560-200
- MPC Index, Chapters 22 and 67

#### HC-130H

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

#### **HU-25A**

- This system/equipment not used on this aircraft
- Refer to the COMDTINST M1414.8, Chapter 2

Airframe Seals 5.B.27

#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the two methods used to seal aircraft airframes.
- **LIST** the purposes for sealing aircraft airframes.
- **STATE** two forms mechanical seals are manufactured in.
- **IDENTIFY** the location of a mechanical seal in an illustration.
- **LIST** three types of rubber used in the manufacture of mechanical seals.
- STATE common locations mechanical seals are found on aircraft.
- **LIST** two procedures for application of mechanical seals.
- **STATE** the three basic types of sealants.
- **IDENTIFY** the location of airframe sealant in an illustration.
- **LIST** two procedures for applications of sealant.

#### References

The information contained in this assignment can be found in the following references:

- Structural Repair Instructions, AFTO 1C-130A-3
- Ground Handling, Servicing, and Airframe Maintenance, AFTO 1C-130H-2-2
- General Use of Cements, Sealants and Coatings, AFTO 42A3-1-2
- Aircraft Weapons Systems Cleaning and Corrosion Control, NAVAIR 01-1A-509 (AFTO 1-1-691)
- FAA Airframe Powerplant Mechanics General Handbook, AC65-9A

5.B.27 Overview

### 

#### Introduction

Methods used to seal aircraft airframes vary depending upon the aircraft or component type. The sealing materials used will generally be the same, but the installation and application procedures can be quite different.

### Methods of Sealing Airframes

The following methods are used to seal airframes:

- Mechanical seals
- Sealant

### Purpose of Airframe Sealing

The purpose of airframe sealing is to accomplish the following:

- Prevent the entrance of dirt, water, air, and aircraft fluids which can lead to extensive corrosion.
- Prevent the loss of fluids, gases, or air.
- Absorb vibration, reduce noise, and cushion impact loads.

#### Introduction

Mechanical airframe seals are used on aircraft to maintain pressurization or for environmental protection.

# Manufactured forms for Mechanical Seals

Mechanical seals are manufactured in two forms:

- Bulk (must be cut to size)
- Preformed (for an exact fit)

### **Types of Rubber**

Mechanical seals are made from rubber. The term "rubber" is as all-inclusive as the term "metal." Types of rubber used to manufacture mechanical seals include:

- Natural
- Synthetic
- Silicone

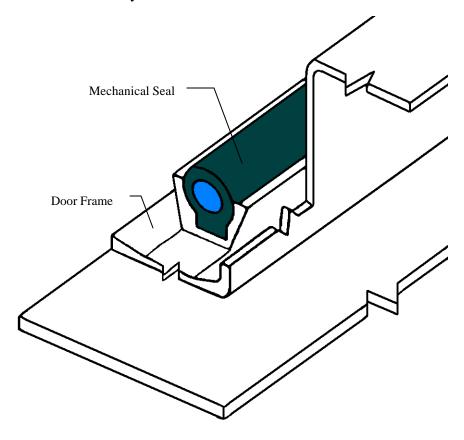
### Mechanical Seal Locations

Mechanical seals are used on many different aircraft components to seal the airframe. Listed below are some of the most common locations:

- Doors
- Windows
- Panels

### Mechanical Seal Illustration

The following illustration shows a mechanical seal application on a door frame cut-away.



### Mechanical Sealing Procedures

Mechanical sealing procedures require *removing* and *installing* the seal. The methods and materials used to remove and install mechanical seals vary depending on aircraft type and component. Always refer to the applicable aircraft maintenance publication for detailed procedures.

5.B.27 Airframe Sealant

#### **Airframe Sealant**

Airframe sealant is used to form a seal between two surfaces. The type of sealant used depends on the application.

#### **NOTE**

Airframe sealants and their applications are presented in "A" School and learned "on the job". Sealants are presented here to show their distinction from mechanical seals.

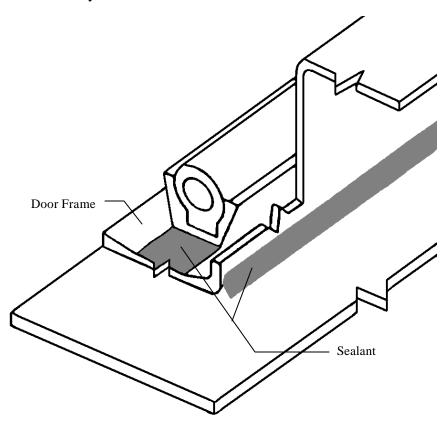
### Basic Types of Sealant

There are three basic types of sealant:

- Pliable
- Drying
- Curing

#### **Sealant Illustration**

The following illustration shows a sealant application on a door frame cut-away.



#### **Sealant Procedures**

Sealant procedures require *removing* and *applying* sealant. The methods and materials used to apply sealants vary depending on aircraft type and component. Always refer to the applicable aircraft maintenance publication for detailed procedures.

### More Reading References

Refer to the following references for more information on sealant and its application:

- General Use of Cements, Sealants and Coatings, AFTO 42A3-1-2
- Aircraft Weapons Systems Cleaning and Corrosion Control, NAVAIR 01-1A-509 (AFTO 1-1-691)

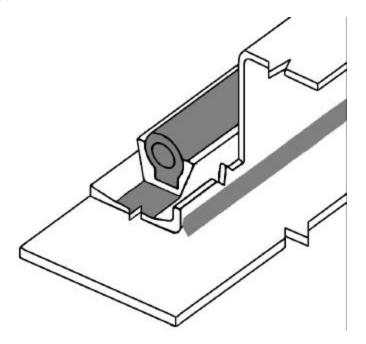
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Questions
-----------

n	swer the following questions on airframe seals:
	What are two methods used to seal airframes?
	1)2)
	List below the purposes for sealing airframes.
	Mechanical seals are manufactured in and forms.
	List below three types of rubber used to manufacture mechanic seals.
	1)
	2)
	3)
	List below common locations mechanical seals are found on aircraft.

# Questions (Continued)

6. In the below illustration, draw a line that points to the mechanical seal.



- 7. Mechanical sealing procedures require \_\_\_\_\_ and \_\_\_\_ the seal.
- 8. List below the three basic types of sealants.

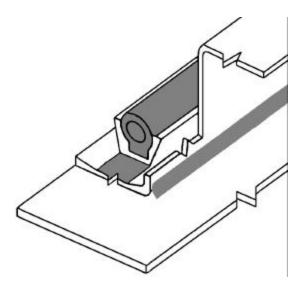
1)\_\_\_\_\_

2)

3)

# Questions (Continued)

9. In the below illustration, draw lines that point to the areas that have sealant applied.



10. Sealant procedures require	and
sealant.	

### **Feedback**

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	1) Mechanical seals	3
	2) Sealant	
2.	Prevent entrance of dirt, water, air, and aircraft fluids which can lead to extensive corrosion.	3
	Prevent the loss of fluids, gases, or air.  Absorb vibration, reduce noise, and cushion impact loads	
3.	Bulk	4
	Preformed	
4.	1) Natural	4
	2) Synthetic	
	3) Silicone	
5.	Doors	5
	Windows	
	Panels	

### Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
6.	Mechanical Seal	5
7.	removing	5
8.	<ol> <li>Pliable</li> <li>Drying</li> <li>Curing</li> </ol>	6
9.	Sealant	6
10.	removing applying	7

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Syllabus 5.		
Performance	REPLACE airframe seals.	
Performance Objective 1	Given an airframe component requiring an airframe seal removal procedure, and necessary equipment, <b>REMOVE</b> the seal using one or more of the following references.	
	HH-65A	
	• MPC Index	
	• 1H-65A-2-1	
	• 1H-65A-3	
	НН-60Ј	
	• MPC Index	
	• A1-H60HA-110-300	
	• A1-H60HA-SRM-000	
	НС-130Н	
	• MPC Index	
	• Job Guide T.O.'s	
	• 1C-130A-3	
	HU-25A	
	• MPC Index	
	• 1U-25A-2	

• 1U-25A-3

Given an airframe component requiring an airframe seal installation procedure, and necessary equipment, **INSTALL** the seal using one or more of the following references.

H	HH-65A			
•	MPC Index			
•	1H-65A-2-1			
•	1H-65A-3			
H	IH-60J			
•	MPC Index			
•	A1-H60HA-110-300			
•	A1-H60HA-SRM-000			
Н	IC-130H			
•	MPC Index			
•	Job Guide T.O.'s			
•	1C-130A-3			
Н	HU-25A			
•	MPC Index			
•	1U-25A-2			
•	1U-25A-3			

Syllabus 5.B.28

#### **Performance**

REPLACE panels in windshields, plastic enclosures, or windows.

### Performance Objective

Given an aircraft and the necessary equipment, **REPLACE** a windshield, plastic enclosure, or window IAW one or more of the following references:

**HH-65A** 

- 1H-65A-2-1, Chapter 52
- AFTO 1-1A-12
- MPC Index, Chapter 52

**HH-60J** 

- A1-H60HA-110-300
- AFTO 1-1A-12
- MPC Index, Chapter 56

HC-130H

- 1C-130H-2-2
- 1C-130H-2-10
- AFTO 1-1A-12
- MPC Index, Chapter 56

**HU-25A** 

- 1U-25A-2
- AFTO 1-1A-12
- MPC Index, Chapter 56

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **MATCH** the methods of inspecting aircraft structural damage to their description.
- **MATCH** the classifications of aircraft structural damage to their description.
- **MATCH** the types of aircraft structural damage repair to their descriptions.
- MATCH internal aircraft structural components to their characteristics.
- MATCH sheet metal bend allowance terms with their definitions.
- **STATE** the two methods used to determine bend allowance.
- LABEL sheet metal bending layout illustrations with their terms.
- **STATE** the names of the bending equipment given bending equipment descriptions.
- **COMPLETE** statements pertaining to sheet metal bending steps.

#### References

The information contained in this assignment can be found in the following references:

- General Structural Repair, AFTO 1-1A-1
- Aviation Structural Mechanic S 3&2, NAVEDTRA 12338
- Air Force Extension Course, Airframe Repair Specialist, 53153 03 7704 Volume 2: Fundamentals of Metalworking
- Air Force Extension Course, Airframe Repair Specialist, 53153 03 7701 Volume 3: Fundamentals of Metalworking
- FAA Airframe & Powerplant Mechanics Airframe Handbook, AC65-15A

5.B.29 Overview

#### Introduction

One of the most important jobs the AMT will encounter is the repair of aircraft structural damage. All repairs must be of the highest quality and conform to the required specifications.

### Using the Structural Repair Manual (SRM)

The procedures and materials needed for structural damage repair are given in the aircraft's Structural Repair Manual (SRM). It is important that the AMT becomes proficient in the use of this manual.

# In This Assignment

This assignment contains the following:

Subject Page
Types of Inspection for Aircraft Structural Damage4
Classifications for Aircraft Structural Damage6
Types of Aircraft Structural Damage Repair9
Internal Repairs for Aircraft Structural Damage
Stringers and Their Repair
Spars and Their Repair
Ribs and Their Repair
Bulkheads and Their Repair
Longerons and Their Repair
Introduction to Sheet Metal Bending Brakes
Cornice Brake
Box and Pan Brake20
General Working Guidelines for Bending Sheet Metal21
Effects of Bending Sheet Metal
Bend Allowance Terminology23

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How to Use a Bend Allowance Chart	.30
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Bend Layout Scenario	34
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# **Types of Inspection for Aircraft Structural Damage**

### Pre-inspection of Damaged Areas

When an aircraft structure has been damaged, the area must be prepared to ensure a thorough inspection can be done. Prior to inspection you must remove all of the following:

- Grease
- Dirt
- Protective coatings (paint, sealant, etc.)

### Methods of Inspection

Three methods used to inspect aircraft structural damage are:

- Visual inspection
- Hardness testing
- Nondestructive inspection

### **Visual Inspection**

A visual inspection will reveal any obvious damage that can be seen by the unaided eye. A boroscope is sometimes utilized to perform an internal visual inspection of a component.

The following table lists items to check for when performing a visual inspection:

Skin	<ul> <li>Dents</li> <li>Abrasions</li> <li>Breaks</li> <li>Cracks</li> <li>Distortion</li> <li>Punctures</li> <li>Wrinkles</li> </ul>						
Riveted/bolted joints	<ul><li>Damage</li><li>Sheared</li><li>Looseness</li><li>Elongated holes</li></ul>						
Secondary damage	Resulting from transmission of shock by the primary damage impact.						

# For More Information

For more detailed information about visual inspections and borescopes refer to assignment 5.D.04, Inspection of Engine Internal Components assignment.

# Types of Inspection for Aircraft Structural Damage (Continued) 5.B.29

### **Hardness Testing**

A hardness test inspection determines if the metal has lost any strength characteristics caused by fire damage.

# For More Information

For more detailed information about portable hardness test units refer to the Aerospace Metals - General Data And Usage Factors manual, AFTO 1-1A-9.

# Nondestructive Inspection

Nondestructive inspections will reveal the full extent of any cracks that cannot be confirmed visually. Depending on the component, any one or more of the following nondestructive test methods may be applicable for the suspect damage area:

- Dye-penetrant
- Magnetic particle
- Eddy current
- Ultrasonic

# For More Information

For more detailed information about nondestructive inspections refer to the following course assignments:

- Inspection of Engine Internal Components assignment, 5.D.04
- Assignment 5.D.01, Eddy Current NDI

#### Introduction

The aircraft SRM specifies the classifications of structural damage.

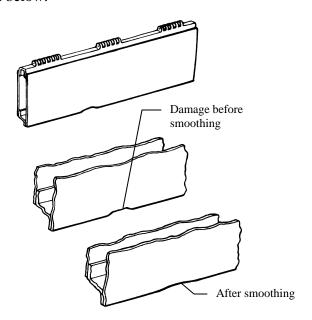
# Damage Classifications

Aircraft structural damage can be classified under one of the following classifications:

- Negligible damage
- Damage repairable by patching
- Damage repairable by insertion
- Damage necessitating replacement

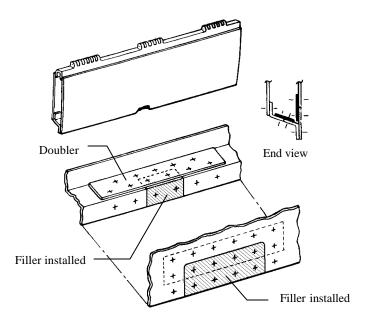
Description and Illustration of Negligible Damage

Negligible damage is damage that can be permitted to exist or can be corrected by a simple procedure without placing a restriction on the flight status of the aircraft. This would include dent removal, stop-drilling cracks, and burnishing scratches or abrasions. See the illustration below.



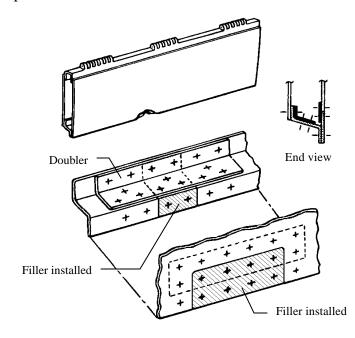
Description and Illustration of Damage Repairable By Patching

Damage repairable by patching is damage that can be repaired by installing reinforcement to bridge the damaged portion of an area. See the illustration below.



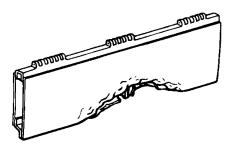
Description and Illustration of Damage Repairable By Insertion

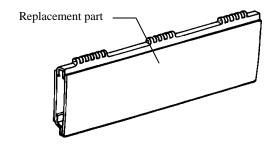
Damage repairable by insertion is damage which can be repaired to give original strength, by inserting a length of repair material of the same shape and characteristics. See the illustration below.



# 5.B.29 Classifications for aircraft Structural Damage (Continued)

Description and Illustration of Damage Necessitating Replacement Damage necessitating replacement is damage which cannot be repaired by any practical means. See the illustration below.





#### Introduction

Determining the type of structural repair to perform is covered in the aircraft's SRM. But, factors can be involved which do not allow a smooth flow of procedures to accomplish the tasking.

# Determining Factors for Repair

The type of structural repair to perform will depend on the:

- Material required (is it on hand?)
- Time available (do mission requirements result in any constraints?)
- Environmental restrictions (e.g., damage occurs away from base, so a temporary repair is applied until a permanent repair can be fabricated)

### **Types of Repair**

The following table lists types of repairs and their descriptions:

Type of Repair	Description							
Permanent	Restores the strength of the repaired structure equal to or greater than its original strength, and satisfies aerodynamic, thermal, and interchangeability requirements.							
Temporary	Restores the load carrying ability of the structure but is not aerodynamically smooth or able to satisfy interchangeability requirements.							
One-time flight	Restores a limited load-carrying ability to the damaged structure in order to fly the aircraft to a facility that can perform the necessary repair.							

# **Internal Repairs for Aircraft Structural Damage**

#### Introduction

The repair of internal structures concerns the repair or replacement of extruded parts used as stringers, webs used as bulkheads, and formed parts, such as ribs and formers.

### Warning

Heed this warning when making internal repairs for aircraft structural damage:

### WARNING

Before the removal, repair, or replacement of a structural member is undertaken, the adjacent structural members of the aircraft must be supported so that proper alignment is maintained throughout the operation.

# Types of Internal Repairs

The following types of internal repairs will be shown in this assignment:

- Stringer
- Spar
- Rib
- Bulkhead
- Longeron

#### **NOTE**

The following repairs covered in this assignment have illustrations of a general nature. Always refer to the aircraft's SRM for specific repair procedures.

#### Definition

A stringer is a spanwise structural member designed to stiffen the skin and aid in maintaining the contour of the structure.

#### **Characteristics**

Stringers have the following characteristics:

- Transfer stresses from the skin to the bulkheads and ribs to which they are attached
- Are not continuous throughout the structure as are longerons and are not subject to as much stress
- In the form of C-channels, angle, or hat sections

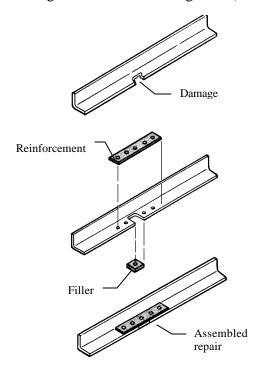
### Methods of Stringer Repair

Stringers may be repaired by the following methods

- Patching (damage *not* exceeding two-thirds of one leg width)
- Patching (damage exceeding one leg width)
- Insertion

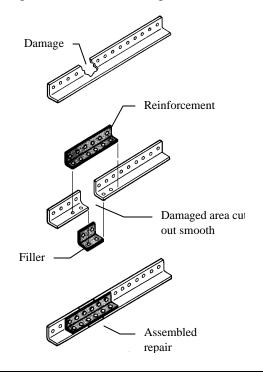
# Stringer Patching Illustration

The following illustration shows a stringer repair by patching (damage not exceeding two-thirds of one leg width):



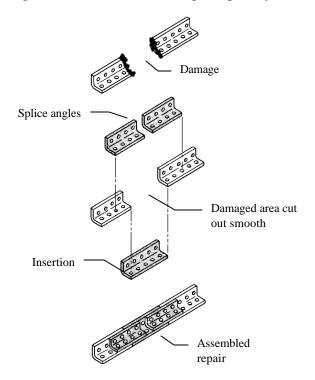
# Stringer Patching Illustration

The following illustration shows a stringer repair by patching (damage exceeding two-thirds of one leg width):



# Stringer Insertion Illustration

The following illustration shows a stringer repair by insertion:



### **Definition**

Spars (also called beams) are the main spanwise member of the wing, stabilizers, and other airfoils.

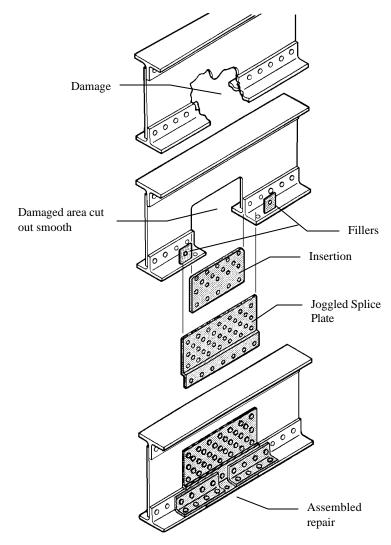
### **Characteristics**

Spars have the following characteristics:

- Run the entire length of the airfoil
- Help absorb the bending loads imposed on the wing or other airfoil
- Are very highly stressed

# Spar Repair Illustration

The following illustration shows a spar repair by insertion:



### **Definition**

Ribs are the principal chordwise members in the wings, stabilizers, and other airfoils.

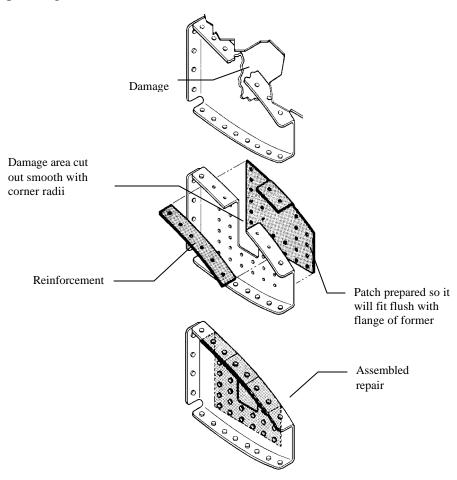
### **Characteristics**

Ribs have the following characteristics:

- Serve as formers for the airfoil
- Give the airfoil shape and rigidity
- Transmit stresses from the skin to the spars
- Resist compression and shear loads

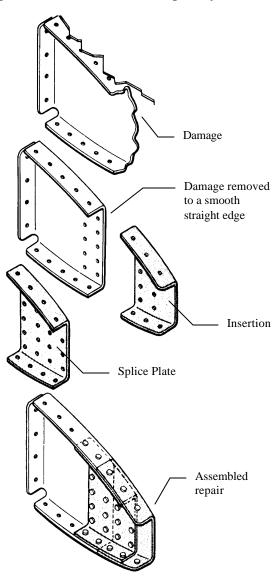
# Rib Patching Illustration

The following illustration shows a web and flange rib repair by patching:



Rib Insertion Illustration

The following illustration shows a rib repair by insertion:



### **Definition**

Any major vertical structural member of a semi-monocoque construction may be considered a bulkhead.

### **Characteristics**

Bulkheads have the following characteristics:

- Maintain the required external contour at the station where they are located
- Give rigidity and strength to the structure
- Are constructed similar to that of wing ribs

# Guidelines for Bulkhead Repair

Bulkhead repairs usually follow the same general guidelines as a web and flange repair for a rib. Follow the guidelines in the aircraft SRM.

### **Definition**

A longeron is a fore-and-aft member of the fuselage or nacelle.

### **Characteristics**

Longerons have the following characteristics:

- Usually run continuous across a number of points of support, such as frames or bulkheads
- Along with stringers, are the major load-carrying members and stiffeners

# Guidelines for Longeron Repair

Longeron repairs follow the same general guidelines as a stringer repair. Follow the guidelines in the aircraft SRM.

# **Introduction to Sheet Metal Bending Brakes**

#### Introduction

There are various types of sheet metal bending equipment used to bend sheet metal.

# Types of Bending Brakes

The two most common types used at aviation field units are the:

- Box and pan brake
- Cornice brake

# For More Information

For information on other types of bending equipment refer to the references listed at the beginning of this assignment.

### Guidelines for Care and Use of Brakes

To keep brakes in good condition, you should:

- Keep the working parts well oiled and be sure the jaws are free of rust and dirt.
- When operating a brake, be careful to avoid doing anything that would spring the parts, force them out of alignment, or otherwise damage them.
- Never bend metal that is beyond the machine's capacity with respect to thickness, shape, or type.

### Springback

Most metals have a tendency to return to their normal shape, a characteristic know as *springback*. Bend the metal 2 - 3 degrees more than desired to allow for springback.

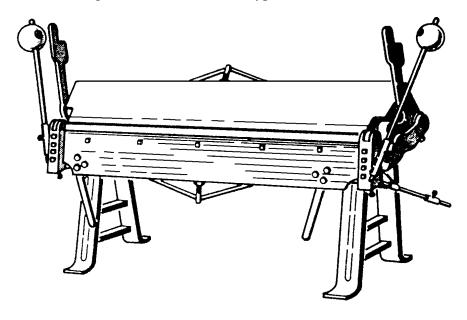
Cornice Brake 5.B.29

## **Description**

The cornice brake is designed to bend large sheets of metal. It can be adjusted to handle a variety of metal thickness' and to bend metal to a variety of radii.

# Cornice Brake Illustration

The following illustration shows one type of cornice brake.



### **Brake Use**

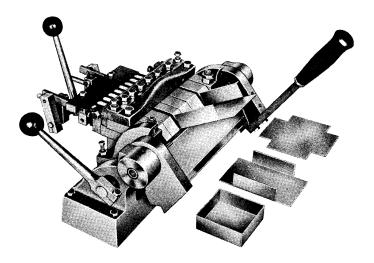
The cornice brake must be setup for each particular job. Always follow the manufacturer's instructions for the setup, adjustment, and operation.

### **Description**

The box and pan brake is designed for making boxes of various sizes and shapes and it permits the forming of all sides without distorting any of the finished bends. The clamping leaf is divided into sections called fingers or shoes. These fingers vary in width, are interchangeable, and correspond in size to the radius used when bending metal (e.g., ½").

# Box and Pan Brake Illustration

The following illustration shows one type of box and pan brake.



#### **Brake Use**

The box and pan brake must be setup for each particular job. Always follow the manufacturer's instructions for the setup, adjustment, and operation.

#### Introduction

Bending sheet metal involves many important steps. Some steps may be applicable to a specific repair as outlined in an aircraft's SRM, but there are some general working practices that always apply when performing bend layout and bending operations.

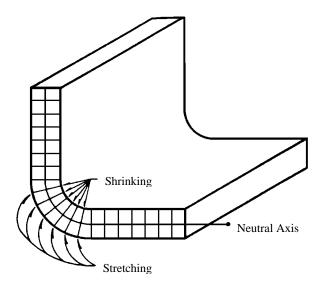
### Guidelines for Bending Sheet Metal

The following are general working guidelines for bending sheet metal:

- Every effort is made to duplicate the strength of the original structural components that have incurred damage.
- All sharp corners are to be avoided by allowing generous corner radii.
- Be meticulous with edge preparation (filing, deburring) to relieve stresses and avoid subsequent cracks.
- Be careful to keep materials clean and free of scratches during preparation.
- Draw all lines with a soft-lead pencil (hard lead will scratch the surface); use isopropyl alcohol or acetone to remove all traces of lead following the bending operations.
- Make all bends *across* the grain of the metal (cracks may form if bent with the grain).
- Drill relief holes anytime two bends intersect to prevent strains from being set up at the intersection of the bends.

# Bending Illustration

The following illustration demonstrates the effects that bending has on sheet metal.



# Effects and Descriptions Table

These are the effects and descriptions of bending sheet metal.

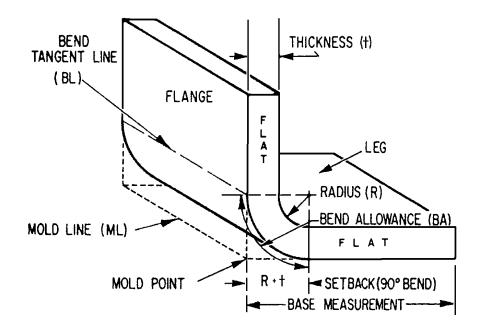
Effects	Description						
Shrinking	The metal is compressed on the inside of the bend.						
Stretching	The metal is stretched on the outside of the bend.						
Neutral line or axis	Point at which the metal neither shrinks nor stretches and the forces of compression and stretching are "neutral".						

### Introduction

When bending metal to exact dimensions, the amount of material needed to form the bend must be known. You must be familiar with the terms used in bending sheet metal so that you can correctly layout measurements.

# Bending Terms Illustration

The following illustration shows bending terms in relation to a piece of sheet metal with a 90 degree bend.



### Bend Allowance Terminology Table

The following table lists sheet metal bending terms and their description. Refer to the illustrations on the previous and following pages.

Term	Description										
Bend allowance	The amount of material consumed in making a bend. There are two methods used to determine bend allowance. Use the following formula:										
(BA)	<b>FORMULA:</b> $(0.01743 \text{ x R} + 0.0078 \text{ x T}) \text{ x N} = \text{BA}$										
	R = the desired bend radius.										
	T = the thickness of the material										
	N = the number of degrees of bend										
	BA = bend allowance										
	Or, refer to a Bend Allowance chart which has pre-calculated bend allowances. Refer to the General Structural Repair manual, AFTO 1-1A-1 (NAVAIR 01-1A-1) for bend allowance tables.										
	BEND ALLOWANCE (BA)										
Closed angle	An angle that is less than 90 degrees when measured between legs.										
	CLOSED ANGLE										

The following is a continuation of the bend allowance terminology table.

Term	Description									
Open angle	An angle that is more than 90 degrees when measured between legs or less than 90 degrees when the amount of bend is measured.									
	OPEN ANGLE									
Flange	The shorter part of a formed angle – the opposite of leg. If each side of the angle is the same length, then each is known as a leg.									
	FLANGE									
Flat	The flat portion of a part is that portion not included in the bend. It is equal to the base measurement minus the setback(s).									
	F L A T									

The following is a continuation of the bend allowance terminology table.

Term	Description
Leg	The longer part of a formed angle.
	LEG
K number	A "K" number is one of 179 numbers on the K-chart that corresponds to one of the angles between 0 and 180 degrees to which metal can be bent.
	When metal is to be bent to any angle other than 90 degrees (K number of 1.0), the corresponding K number is selected from the chart and multiplied by the sum of the radius and the thickness of the metal. The product is the amount of setback for the bend.
	Refer to the General Structural Repair manual, AFTO 1-1A-1 (NAVAIR 01-1A-1), for detailed information about the K-chart.

The following is a continuation of the bend allowance terminology table.

nued) _										
Term	Description									
Bend line	The bend line (also called the brake or sight line) is the layout line on the metal being formed that is set even with the nose of the brake jaw, and it serves as a guide in bending the work.									
	Before forming a bend, it must be decided which end of the material can be most conveniently inserted in the bending brake. The bend line is then measured and marked from the bend tangent line closest to the end that is to be placed under the brake. This measurement should be equal to the radius of the bend. The metal is then inserted in the brake so that the nose of the brake jaw will fall directly over the bend line.									
	Sight Line  Brake Jaw: adjust back one material thickness from bending leaf  Bend Tangent Lines  Bend Tangent Lines									
Bend tangent line (BL)	The line at which the metal starts to bend, and the line at which the metal stops curving.  BEND TANGENT LINE (BL)									

The following is a continuation of the bend allowance terminology table.

Term	Description
Mold line (ML)	The line formed by extending the outside surfaces of the leg and the flange. (An imaginary point from which real base measurements are provided on drawings.)
	MOLD LINE (ML)
Mold point	An imaginary point at the outside intersection of the flange and leg
	MOLE BOINT
	MOLD POINT
Base measurement	The base measurement is the outside dimension of a formed part. A combination square can be used to measure the outside surfaces of a formed part.
	BASE MEASUREMENT

The following is a continuation of the bend allowance terminology table.

Term	Description						
Radius (R)	The radius of the bend is always to the inside of the metal being formed unless otherwise stated. It will be stated in the aircraft SRM. The bending brake jaw (or finger) size used to bend the metal must also correspond to the bend radius given in the aircraft SRM.						
	RADIUS (R)						
Setback	The setback (SB) is the distance from the bend tangent line to the mold point.						
	In a 90 degree bend, $SB = R + T$ (radius of bend plus thickness of the metal). The setback dimension must be determined prior to making the bend because setback is used in determining the location of the beginning bend tangent line.						
	Setback for bends other than 90 degrees is determined by using a K-chart.						
	R++ SETBACK(90° BEND)						

#### **Purpose**

The purpose of a bend allowance chart is to provide a quick reference for determining the bend allowance for a bend. The chart can be used instead of calculating bend allowance by using the bend allowance formula.

### Bend Allowance Chart Illustration

The following is a bend allowance chart. It is only a partial listing for illustrative purposes.

THIS PADIUS	1/32	1/16	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2
THICKNESS	.031	.063	.094	.125	.156	.188	.219	.250	.281	.313	.344	.375	.438	.500
.020	.062	.113	.161	.210	.259	.309	.358	.406	.455	.505	.554	.603	.702	.799
	.000693	.001251	.001792	.002333	.002874	.003433	.003974	.004515	.005056	.005614	.006155	.006695	.007795	.008877
.025	.066	.116	.165	.214	.263	.313	.362	.410	.459	.509	.558	.607	.705	.803
	.000736	.001294	.001835	.002376	.002917	.003476	.004017	.004558	.005098	.005657	.006198	.006739	.007838	.008920
.028	.068	.119	.167	.216	.265	.315	.364	.412	.461	.511	.560	.609	.708	.804
	.000759	.001318	.001859	.002400	.002941	.003499	.004040	.004581	.005122	.005680	.006221	.006762	.007853	.007862
.032	.071	.121	.170	.218	.267	.317	.366	.415	.463	.514	.562	.611	.710	.807
	.000787	.001345	.001886	.002427	.002968	.003526	.004067	.004608	.005149	.005708	.006249	.006789	.007889	.008971
.038	.075	.126	.174	.223	.272	.322	.371	.419	.468	.518	.567	.616	.715	.812
	.000837	.001396	.001937	.002478	.003019	.003577	.004118	.004659	.005200	.005758	.006299	.006840	.007940	.009021
.040	.077	.127	.176	.224	.273	.323	.372	.421	.469	.520	.568	.617	.716	.813
	.00853	.001411	.001952	.002493	.003034	.003593	.004134	.004675	.005215	.005774	.006315	.006856	.007955	.009037
.051		.134 .001413	.183 .002034	.232 .002575	.280 .003116	.331 .003675	.379 .004215	.428 .004756	.477 .005297	.527 .005855	.576 .006397	.624 .006934	.723 .008037	.821 .009119

#### **Chart Particulars**

To determine bend allowance for any degree of bend by use of the bend allowance chart, find the allowance per degree for the thickness of the material and the radius of bend in question, and then multiply by the number of degrees in the bend.

Radius of bend is given as a decimal fraction on the top line of the chart. Bend allowance is given directly below the radius figures. The top number in each case is the bend allowance for a 90 degree angle, while the lower placed number is for a one degree angle. Material thickness is given in the left column of the chart.

Determining Bend Allowance for 90 Degree Bends To determine the bend allowance for a 90 degree bend, use the step action table below. The following scenario criteria applies:

- Metal sheet thickness is .040
- Bend radius is \(^1\)4" (.250)

Step	Action
1	Read across the top of the chart and find the column for a radius of bend of 1/4".
2	Find the block in the column that is opposite the metal thickness of .040.
3	Use the top number (.421) in the block for bend allowance421 is the bend allowance for this scenario.

Determining Bend Allowance for "Other Than" 90 Degree Bends To determine the bend allowance for other than 90 degree bends, use the step action table below. The following scenario criteria applies:

- Metal sheet thickness is .040
- Bend radius is \(^1\)4" (.250)
- Degree of bend desired is 60 degrees

Step	Action
1	Read across the top of the chart and find the column for a radius of bend of 1/4".
2	Find the block in the column that is opposite the metal thickness of .040.
3	Multiply the bottom number in the block by 60 (.281)281 is the bend allowance for this scenario.

# Purpose

The purpose of a setback K-chart is to calculate setback for angles larger or smaller than  $90\ degrees$ .

# Setback K-chart Illustration

The following is a K-chart.

For bend other than 90 ° Setback = K [R + T]							
Ang [deg]	K-value	Ang [deg]	K-value	Ang [deg]	K-value	Ang [deg]	K-value
1	0.00873	46	0.42447	91	1.0176	136	2.4751
2	0.01745	47	0.43481	92	1.0355	137	2.5386
3	0.02618	48	0.44523	93	1.0538	138	2.6051
4	0.03492	49	0.45573	94	1.0724	139	2.6746
5	0.04366	50	0.46631	95	1.0913	140	2.7475
6	0.05241	51	0.47697	96	1.1106	141	2.8239
7	0.06116	52	0.48773	97	1.1303	142	2.9042
8	0.06993	53	0.49858	98	1.1504	143	2.9887
9	0.07870	54	0.50952	99	1.1708	144	3.0777
10	0.08749	55	0.52057	100	1.1917	145	3.1716
11	0.09629	56	0.53171	101	1.2131	146	3.2708
12	0.10510	57	0.54295	162	1.2349	147	3.3759
13	0.11393	58	0.55431	103	1.2572	148	3.4874
14	0.12278	59	0.56577	104	1.2799	149	3.6059
15	0.13165	60	0.57735	105	1.3032	150	3.7320
16	0.14054	61	0.58904	106	1.3270	151	3.8667
17	0.14945	62	0.60086	107	1.3514	152	4.0108
18	0.15838	63	0.61280	108	1.3764	153	4.1653
19	0.16734	64	0.62487	109	1.4019	154	4.3315
20	0.17633	65	0.63707	110	1.4281	155	4.5107
21	0.18534	66	0.64941	111	1.4550	156	4.7046
22	0.19438	67	0.66188	112	1.4826	157	4.9151
23	0.20345	68	0.67451	113	1.5108	158	5.1455
24	0.21256	69	0.68728	114	1.5399	159	5.3995
25	0.22169	70	0.70021	115	1.5697	160	5.6713
26	0.23087	71	0.71329	116	1.6003	161	5.9758
27	0.24008	72	0.72654	117	1.6318	162	6.3737
28	0.24933	73	0.73996	118	1.6643	163	6.6911
29	0.25862	74	0.75355	119	1.6977	164	7.1154
30	0.26795	75	0.76733	120	1.7320	165	7.5957
31	0.27732	76	0.78128	121	1.7675	166	8.1443
32	0.28674	77	0.79543	121	1.8040	167	8.7769
33	0.29621	78	0.80978	122	1.8418	168	9.5144
33 34	0.30573	79	0.80978	123	1.8807	169	10.385
3 <del>4</del> 35	0.305/3	80	0.82434 0.83910	124 125	1.8807	170	11.430
35 36	0.31530	81		125 126		170	12,706
36 37		81	0.85408		1.9626 2.0057	171	14.301
37 38	0.33459	82 83	0.86929	127		172	
	0.34433	1	0.88472	128	2.0503		16.350
39	0.35412	84	0.90040	129	2.0965	174	19.081
40	0.36397	85	0.91633	130	2.1445	175	22.904
41	0.37388	86	0.93251	131	2.1943	176	26.636
42	0.38386	87	0.94890	132	2.2460	177	38.138
43	0.39391	88	0.96569	133	2.2998	178	57.290
44	0.40403	89	0.98270	134	2.3558	179	114.590
45	0.41421	90	1.0000	135	2.4142	180	Infinite

### Determining Setback with a K-Chart

To determine the setback for angles larger or smaller than 90 degrees, use the step action table below. The following scenario criteria applies:

- Setback formula (is always): Setback = K(R+T)
- Bend radius is 1/4" (.250)
- Metal thickness is .040
- Angle of bend is 45 degrees

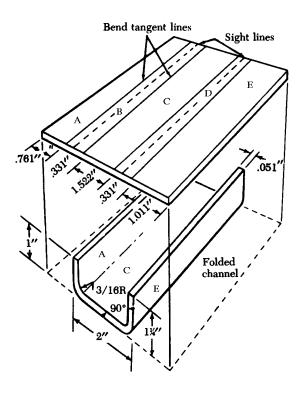
Step	Action
1	Determine the angle of bend desired (45 degrees).
2	Add the bend radius and the metal thickness $(.250 + .040 = .290)$ .
3	Find the K value for a 45-degree angle (0.41421).
4	Multiply the K value by the results in Step 2 $(0.41421 \text{ x } .290 = .120)$ 120 is the setback for this scenario.

#### Introduction

The following pages will outline bend layout steps for the below illustration and scenario information.

# Bend Layout Illustration

Refer to the following bend layout illustration while reading the subsequent bend layout procedures.



### Scenario Information

The following criteria is given for this scenario:

- Fabricate a channel from a flat layout
- Flat A is 1"
- Flat C is 2"
- Flat E is 1 1/4"
- Material thickness is .051
- Radius of the bend is to be 3/16" (0.188)

# Bend Layout Procedures

The following steps outline the procedures for bend layout to fabricate a channel *not* intended for patch or insertion material. An example of what it could be used for is a reinforcement riveted to a flat piece of metal to add strength and prevent buckling.

Step	Action
1	Square a corner of the metal. Now there are two straight sides.
	<ul> <li>Lay out lines from the side that allows all lines to be drawn across the metal grain direction. DO NOT lay out lines with the metal grain direction because cracks will form during the bending evolution. See the below illustration.</li> </ul>
	Squared corner Straight side
	Straight side Grain Direction
	Notice that the lines can be drawn between 45 and 90 degrees from the metal's grain direction. If possible, always layout lines 90 degrees from the metal's grain direction, as is illustrated above. When this is not possible due to the required bend line position, draw bend lines within a 45 to 90 degree area. Anything less than 45 degrees increases the possibility of cracks developing when bending.

## Bend Layout Procedures (Continued)

This is a continuation of the bend layout procedures step action table.

Step	Action
2	Determine the setback to establish the distance of the flats.
	- The setback for the first bend:
	Setback = R + T = 0.188 + 0.051 = 0.239
	- The first flat (A) is equal to the overall dimension less setback:
	Flat A = 1.000 - 0.239 = 0.761
	<ul> <li>Mark off this distance and draw the line for flat A (this is also the first bend tangent line).</li> </ul>
3	Calculate the bend allowance (B) for the first bend. Consult a bend allowance chart or use the formula:
	- BA = 0.3307 or .331 (rounded to nearest thousandth).
	<ul> <li>Mark off this distance from the line drawn in Step 2 and draw a line (this is the next bend tangent line).</li> </ul>
4	Lay off the second flat (C). This is equal to the overall dimension less the setback at each end, or flat (C) minus two setbacks:
	- Flat C = 2.00 - (0.239 + 0.239) = 2.000478 = 1.522
	<ul> <li>Mark off this distance and draw a line (this is the third bend tangent line).</li> </ul>

## Bend Layout Procedures (Continued)

This is a continuation of the bend layout procedures step action table.

Step	Action
5	The bend allowance for the second bend (D) is the same at that for the first bend (0.331). Mark off this distance and draw the fourth and last bend tangent line.
6	The third flat (E), is equal to the overall dimension less the setback:  - Flat E = 1.250 - 0.239 = 1.011  - Mark off this distance and draw a line.
7	Cut off the excess material.  Mark off the bend sight lines. This is done by measuring out one bend radius from the bend tangent line closest to the end which is to be inserted under the nose of the brake jaw.

### Bend Layout Procedures (Continued)

This is a continuation of the bend layout procedures step action table.

Step	Action
8	Insert the metal in a brake facing in the proper direction as explained in step 6 (see the below illustration), and then bend flats A and E to 90 degrees
	Bending  Bend Tangent Lines  Bend Tangent Line

### Summary

When adding the measurements of flats A, C, and E, and both bend allowances, you get 3.956, or approximately 4.00 inches. If you had simply added the three overall dimensions 1, 2, and 1 ¼ inches the total would have been 4.250 inches of material length.

You can see how setback and bend allowance affect material lengths in forming bends. In this case the reduction is approximately ¼ inch.

#### Introduction

The job aids shown on the following pages were created to help show the order of layout lines for a bend layout.

Two different job aids are shown and are used for different reasons. Sometimes they will both be needed to complete a bend layout. The job aids are called:

- base measurement
- doubler

## Baseline Dimensioning

The calculations in the running totals column of the job aides use baseline dimensioning. Baseline dimensioning bases all measurements from the same referenced starting point i.e., the edge of the metal that all lines are drawn from. This method of measuring provides consistent, accurate layouts.

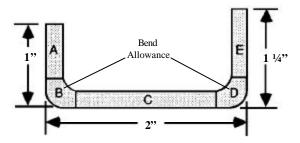
#### NOTE

In the procedure steps on the previous pages, all subsequent measurements were made from the previously drawn line or reference point. This is called "continuous dimensioning".

#### Job Aid Guidelines

Refer to these guidelines while working with the job aids.

- Bend layout and the use of these job aids requires practice to attain even a minimum amount of proficiency.
- These job aids can be manually drawn and used at the job site.
- Refer to a decimal chart when converting to fractions. Be careful that the correct fraction is determined; rarely will you exactly match the decimal number to a fraction. In these cases you must determine, and use, the fraction closest to the decimal number.
- The following illustration shows how the letters in the job aids relate to a formed bend layout.



#### Purpose for Base Measurement Job Aid

The base measurement job aid is used to:

- Calculate base measurements to form a piece of metal.
- Calculate base measurements of pre-formed components such as C-stringers, longerons, etc. (needed to prepare a doubler).

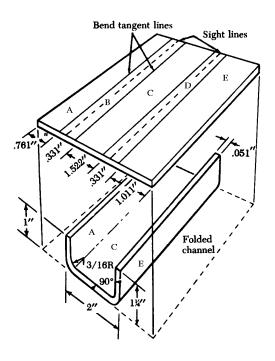
#### Scenario

The same criteria as the previous scenario is used here again.

- Fabricate a channel from a flat layout
- Flat A is 1"
- Flat C is 2"
- Flat E is 1 1/4"
- Material thickness is .051
- Radius of the bend is to be 3/16" (0.188)

## Bend Layout Illustration

The following bend layout illustration corresponds to the below job aid.



### Base Measurement Job Aid Example

The following is a base measurement job aid example for bend layout calculations. The calculations shown in this example correspond to the procedure steps on the previous pages.

BA = .3 Materi	331 al Thickness = .051"	A	В	С	D	Е	F	G
1	Base Measurement	1.000		2.000		1.250		
2	Setback or Double Setback	0.239		0.478		0.239		
3	Flats	0.761	0.331	1.522	0.331	1.011		
4	Convert to Fractions	49/64	21/64 <b>_</b> _	1 33/64	21/64	1 1/64	<b>4</b> 1	<b>√</b> ⊥
5	Running Totals	49/64	1 3/32	2 39/64	2 15/16	3 63/64		•

## Job Aid Procedures Table

The following base measurement job aid procedures table corresponds to the steps listed in the base measurement job aid.

Step	Action
1	Determine the length of the flats and convert to decimals. Place the measurements in the applicable columns.
2	Determine the radius and thickness of the base material component, then compute setback $(R+T)$ . Remember, if other than a 90-degree bend, use the setback K-chart.
	Determine double setback, 2(R+T). This number is placed in column C in this example. Double setback must be allowed for when a flat is between two bends.
3	Subtract row 2 in the columns from row 1. This is the new length of the flats.
	Between the flats you must allow for bend allowance. Determine bend allowance and place the decimal number in the applicable column, in this case B and D.
4	Covert all decimal numbers in row 3 to fractions.
5	Add the running totals.
	In the example, $49/64 + 21/64 = 13/32$ . And then, $13/32 + 133/64 = 239/64$ and so on The arrows aid in following the correct order.
	The running totals row shows where to lay out each dimension line.

Doubler Job Aid 5.B.29

#### Introduction

The following doubler job aid example is built upon the base measurement job aid on the preceding pages. Refer back to the scenario and illustrations there.

## Purpose for Doubler Job Aid

The doubler job aid is used to calculate the measurements for a doubler bend layout.

#### Procedures Prior to Using Doubler Job Aid

Before the doubler job aid can be used, the base measurement job aid must first be completed. Look at is this way – before you can fabricate a channel to insert in a stringer, you must first know the dimensions of the stringer. Otherwise, you could not accurately layout the bend lines for a proper fit after forming.

### Base Measurement Job Aid Example

The following base measurement job aid example is shown here again to aid in referencing when reading the doubler job aid procedures.

BA = .8 Materi	331 al Thickness = .051"	A	В	С	D	Е	F	G
1	Base Measurement	1.000		2.000		1.250		
2	Setback or Double Setback	0.239		0.478		0.239		
3	Flats	0.761	0.331	1.522	0.331	1.011		:
4	Convert to Fractions	49/64	21/64	1 33/64	21/64 <b>√</b> ⊥	1 1/64	<b>4</b> 1	<b>1</b>
5	Running Totals	49/64	1 3/32	2 39/64	2 15/16	3 63/64	•	<b>V</b>

# Doubler Job Aid Example

The following is an example of a doubler job aid for bend layout calculations. As you read the procedures on the next page you will see how these calculations relate to the base measurement job aid above.

SA = Mater	:340 rial Thickness = .063*	A	В	c	D	E	F	G
1	Base Measurement	1.000		2.000		1.250	(m) (iii)	
	Bux Material Thickness	0.051		0.102		0.051		
2	Now Ease Measurement	0.949		1.898		1.199	27757	¥ 78
3	Setback or Double Setback	0.251		0,502		0.251	50	
4	Flats	0.698	0.340	1.396	0.340	0.948		
5	Convert to Fractions	45/64	11/32	1 25/64	11/32	61/64	, _	<i>-</i> 1
6	Running Totals	45/64	1 3/64	2 7/16	2 25/32	3 47/64	•	· V

## Job Aid Procedures Table

The following doubler job aid procedures table corresponds to the steps listed in the doubler job aid.

Step	Action								
1	Using a combination square, determine the outside dimensions of the base material component and convert to decimals. Place the measurements in the applicable columns.								
2	Base material thickness: this must be accounted for so that the formed metal will fit on the inside or outside of the base material component. Note that the measurement is doubled in column C between the two bends.								
	New Base M	<u>Measurement</u> : use the belo	ow decision table.						
		If	Then						
	the doubler is to be fastened to the <i>inside</i> measurement.								
		the doubler is to be fastened to the <i>outside</i> of the base material	add to the base measurement.						
3	Determine the radius and thickness of the base material component, then compute setback $(R+T)$ . Remember, if other than a 90-degree bend, use the setback K-chart.								
	Determine double setback, 2(R+T). This number is placed in column C in this example. Double setback must be allowed for when a flat is between two bends.								
4	Subtract row 3 in the columns from the new base measurement in row 2. This is the new length of the flats.								
	Between the flats you must allow for bend allowance. Determine bend allowance and place the decimal number in the applicable column, in this case B and D.								
5	Covert all de	ecimal numbers in row 4	to fractions.						
6	Add the rund dimension li	_	totals row shows where t	to lay out each					

### Questions

Answer the following questions on aircraft structural damage repair:

1. Match the aircraft structural damage inspection methods in column A to their descriptions in column B. Use each letter only once.

Column A		Column B
1. Visual	a.	Secondary damage may be found during this method.
2. Nondestructive test	b.	Determines if the metal has lost any strength.
3. Hardness test	c.	Dye-penetrant is a type of this method.
	d.	Is a pre-inspection procedure.

2. Match the classifications of aircraft structural damage in column A to their descriptions in column B. Use each letter only once.

Column A		Column B
1. Negligible damage	a.	Can be permitted to exist or can be corrected by a simple procedure.
2. Damage repairable by patching	b.	Gives original strength, by inserting a length of repair material of the same shape and characteristics.
3. Damage repairable by insertion	c.	Reinforcement is used to bridge the damaged portion.
4. Damage necessitating replacement	d.	Cannot be repaired by any practical means.
	e.	Not a damage classification.

# Questions (Continued)

3. Match the aircraft structural damage repair types in column A to their description in column B. Use each letter only once.

Column A		Column B
1. Permanent	a.	Restores the load carrying ability of the structure but is not aerodynamically smooth or able to satisfy interchangeability requirements.
2. Temporary	b.	Restores a limited load-carrying ability to the damaged structure in order to fly the aircraft to a facility that can perform the necessary repair.
3. One-time flight	c.	Restores the strength of the repaired structure equal to or greater than its original strength, and satisfies aerodynamic, thermal, and interchangeability requirements.
	d.	Not a type of damage repair.

## 5.B.29 Aircraft Structural Damage Repair Self-Quiz (Continued)

# Questions (Continued)

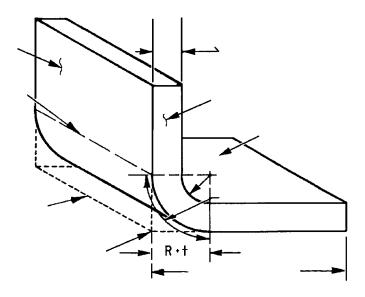
4. Match the internal aircraft components in column A to their characteristics in column B. Each component has two answers.

Column A	Column B
,1. Stringer	a. Any major vertical structural member of a semi-monocoque construction.
,2. Spar	b. Helps absorb the bending loads imposed on wings or other airfoils.
,3. Rib	c. Designed to stiffen the skin.
,4. Bulkhead	d. Repair follows the same general guidelines as a stringer repair.
,5. Longeron	e. Gives rigidity and strength to the structure.
	f. Principle chordwise member in airfoils.
	g. Transfers stresses from the skin to the bulkheads and ribs.
	h. Fore-and-aft member of the fuselage.
	i. Main spanwise member of a wing.
	j. Resists compression and shear loads.
• •	etal bending brake is designed to bend large an be adjusted to handle a variety of metal adii?

# Questions (Continued)

6. What type of sheet metal bending brake is designed for making boxes of various sizes and shapes and permits the forming of all sides without distorting any of the finished bends?

7. In the below illustration, label the arrows with the correct bend layout terms.



## 5.B.29 Aircraft Structural Damage Repair Self-Quiz (Continued)

Questions
(Continued

8.	What are the two methods used to determine bend allowance?
	1)
	2)
	2)

9. Match the bend allowance terms in column A with their definitions in column B. Use each letter only once.

Column A		Column B
 1. Bend allowance	a.	The distance from the bend tangent line to the mold point.
 2. Bend tangent line	b.	The outside dimension of a formed part.
 3. Bend line	c.	The line at which the metal starts to bend, and the line at which the metal stops curving.
 4. Base measurement	d.	The layout line that is set even with the nose of the brake jaw.
 _5. Setback	e.	The amount of material consumed in making a bend.
	f.	The longer part of a formed angle.

Questions
(Continued)

10.	When laying out lines during bend layout steps, you should draw lines the metal grain direction.
11.	DO NOT draw bend layout lines with the metal grain direction because
12.	Bend sight lines are marked off by measuring out from the bend tangent line closest to the end which is to be inserted under the nose of the brake jaw.
13.	When bending metal in a brake, the brake jaw must be adjusted

## Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	1. a 2. c 3. b	4 5 5
2.	1. a 2. c 3. b 4. d	6 7 7 8
3.	1. c 2. a 3. b	9
4.	1. c, g 2. b, i 3. f, j 4. a, e 5. d, h	11 13 14 16 17
5.	Cornice Brake	19
6.	Box and Pan brake	20

## Aircraft Structural Damage Repair Self-Quiz Feedback (Continued)

# Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
7.	FLANGE  THICKNESS (†)  TANGENT LINE  (BL)  FLAT  LEG  RADIUS (R)  BEND ALLOWANCE (BA)  MOLD POINT  R · † SETBACK (90° BEND)  BASE MEASUREMENT	23
8.	<ol> <li>Bend allowance formula</li> <li>Bend allowance chart</li> </ol>	24
9.	1. e 2. c 3. d 4. b 5. a	24 27 27 28 29
10.	across	35
11.	cracks will form during the bending evolution.	35
12.	one bend radius	37
13.	one material thickness	38

5.B.29 Blank Page

Performance 1	REPAIR a corrosion damaged aircraft structure.	
	Example: skin, rib, stringer, etc.	
Performance 1, Objective 1	Given a corrosion damaged aircraft structure and the necessary equipment, determine the damage classification and <b>REPORT</b> the findings to your supervisor IAW the aircraft's Structural Repair Manual.	
	НН-65А	ø
	НН-60Ј	Þ
	НС-130Н	Þ
	HU-25A	Þ

Syllabus

Continued next page

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## Performance 1, Objective 2

Given a corrosion damaged aircraft structure and the necessary equipment, **REMOVE** the corrosion as required using one or more of the following references.

HH-65A

- AR&SC Technical Services
- TCTO's
- MPC Index
- 1H-65A-3
- NAVAIR 01-1A-509

**HH-60J** 

- AR&SC Technical Services
- TCTO's
- MPC Index
- A1-H60CA-SRM-300
- A1-H60HA-SRM-000
- NAVAIR 01-1A-509

HC-130H

- AR&SC Technical Services
- TCTO's
- MPC Index
- 1C-130A-3
- 1C-130A-23
- NAVAIR 01-1A-509

## Performance 1, Objective 2 (Continued)

### **HU-25A**

- AR&SC Technical Services
- TCTO's
- MPC Index
- 1U-25A-3
- 1U-25A-23
- NAVAIR 01-1A-509

Performance	1,
Objective 3	

Given a damaged aircraft structure and the necessary equipment, **FABRICATE** a repair for the given structure area using one or more of the following references.

HH-65A

- AR&SC Technical Services
- TCTO's
- 1H-65A-3
- AFTO 1-1A-1
- AFTO 1-1A-8

HH-60J

- AR&SC Technical Services
- TCTO's
- A1-H60HA-SRM-000
- AFTO 1-1A-1
- AFTO 1-1A-8

HC-130H

- AR&SC Technical Services
- TCTO's
- 1C-130A-3
- 1C-130A-23
- AFTO 1-1A-1
- AFTO 1-1A-8

## Performance 1, Objective 3 (Continued)

### **HU-25A**

- AR&SC Technical Services
- TCTO's
- 1U-25A-3
- AFTO 1-1A-1
- AFTO 1-1A-8

## Performance 1, Objective 4

Given an aircraft structure area and the necessary equipment, **APPLY** the required protective coating(s) using one or more of the following references.

following references. **HH-65A** • TCTO's • 1H-65A-3 • AFTO 1-1-8 • NAVAIR 01-1A-509 **HH-60J** • TCTO's • A1-H60CA-SRM-300 • A1-H60HA-SRM-000 • AFTO 1-1-8 • NAVAIR 01-1A-509 HC-130H • TCTO's • 1C-130H-2-00JG-00-1 • 1C-130A-3 • 1C-130A-23 • AFTO 1-1-8 • NAVAIR 01-1A-509 **HU-25A** • TCTO's • 1U-25A-3 • AFTO 1-1-8

• NAVAIR 01-1A-509

Performance 2	REPAIR a corrosion damaged aircraft electrical component.		
	Example: wiring, cables, connectors, etc.		
Performance 2, Objective 1	Given a corrosion damaged aircraft electrical component and the necessary equipment, <b>REMOVE</b> the corrosion as required using one or more of the following references.		
	HH-65A		
	• TCTO's		
	• MPC Index		
	• NAVAIR 16-1-540		
	НН-60Ј		
	• TCTO's		
	• MPC Index		
	• A1-H60CA-SRM-300		
	• NAVAIR 16-1-540		
	НС-130Н		
	• TCTO's		
	• MPC Index		
	• 1C-130A-23		
	• NAVAIR 16-1-540		
	HU-25A		
	• TCTO's		
	• MPC Index		
	• NAVAIR 16-1-540		

## Performance 2, Objective 2

Given a damaged aircraft electrical component and the necessary equipment, **PERFORM** the repair procedure applicable to the damage using one or more of the following references.

**HH-65A** 

- AR&SC Technical Services
- TCTO's
- 1H-65A-2-2
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

#### **HH-60J**

- AR&SC Technical Services
- TCTO's
- A1-H60CA-WCR-000
- A1-H60JA-WDM-000
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

#### HC-130H

- AR&SC Technical Services
- TCTO's
- 1C-130H-2-13
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

### Performance 2, Objective 2 (Continued)

### **HU-25A**

- AR&SC Technical Services
- TCTO's
- 1U-25A-2
- 1U-25A-2-9
- AFTO 1-1A-14
- NAVAIR 01-1A-505 (series)

## Performance 2, Objective 3

Given an electrical component and the necessary equipment, **APPLY** the required protective coating(s) using one or more of the following references.

**HH-65A** 

- TCTO's
- MPC Index
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

**HH-60J** 

- TCTO's
- MPC Index
- A1-H60CA-SRM-000
- A1-H60CA-SRM-300
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

HC-130H

- TCTO's
- MPC Index
- 1C-130H-2-00JG-00-1
- 1C-130A-23
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

## Performance 2, Objective 3 (Continued)

### **HU-25A**

- TCTO's
- MPC Index
- 1U-25A-2
- NAVAIR 01-1A-509
- NAVAIR 16-1-540

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the effects of vibration on the human body and aircraft.
- **STATE** the goals of vibration analysis.
- **STATE** the unit of measurement the CG uses to measure vibration.
- **STATE** the functions of vibration measuring equipment.
- **STATE** the characteristics of an imbalanced condition.
- **STATE** the purpose of flexible couplings.
- **STATE** the probable causes of different types of vibrations.

#### References

The information contained in this assignment can be found in the US Navy Helicopter Vibration Analysis manual, NAVAIR 01-1A-24.

5.B.30 Overview

### Introduction

The purpose of this assignment is to introduce you to the equipment and terminology used for vibration analysis. It also lists some of the more common symptoms of vibration and their probable causes.

### In This Assignment

In this assignment we will discuss the following topics:

Subject	Page
Effects of Vibration	3
Goals of Vibration Analysis	4
Equipment Used to Measure Vibration	5
Causes of Vibrations	6
Vibration Analysis Self-Quiz	11
Vibration Analysis Self-Quiz Feedback	12
Syllabus	13

#### Introduction

Aircraft vibrations, if not eliminated or reduced to acceptable levels, can have detrimental effects on equipment and aircrew members.

## Effects on Aircrew

Effects of direct vibration on the human body can be serious. Depending on the level of severity, vibrations can have varying degrees of the following effects on aircraft crewmembers:

- Discomfort from unwanted noise
- Fatigue
- Blurred vision
- · Loss of balance
- Loss of concentration

## Effects on Equipment

Vibrations cause stress and fatigue on aircraft and equipment which can lead to component failure.

### Vibration Analysis Goals

The goals of vibration analysis are as follows:

- Increase aircraft availability
- Reduce aircraft repair costs
- Improve aviation safety

## Accomplishing Goals

To accomplish these goals vibration analysis provides the following:

- Insight assistance in troubleshooting vibration discrepancies
- Reduce maintenance staff hours
- Reduce removal of serviceable components
- Help determine the cause of chronic failures
- Plan repairs/component replacement
- Prevent unnecessary disassembly for inspection

#### Introduction

Special equipment is used to perform vibration analysis on aircraft. The equipment is different for fixed-wing and rotary-wing aircraft as indicated below.

#### Vibration Measuring Systems

The Coast Guard is currently using the following vibration measuring systems to perform vibration surveys on the following aircraft:

#### HH-60J and HH-65A Helicopters

• Helitune Rotortuner

#### HC-130H and HU-25A Aircraft

• Quantec 9500

#### **NOTE**

Specific operating procedures for these systems can be found in each aircraft's applicable maintenance manuals and MPC cards.

#### **Accelerometer**

The accelerometer is a component of each vibration measuring system. Most systems typically use multiple accelerometers mounted at various positions on the component being surveyed. An accelerometer functions as a pickup assembly that senses the movement of the component it is mounted to and produces a voltage proportional to acceleration. This electrical signal is sent to the measuring unit for recording and interpretation.

#### Measurement

The Coast Guard uses velocity, measured in inches per second (IPS) to measure vibration.

## Definition of Velocity

Velocity is the time rate of change of displacement or how many inches the accelerometer will move in one second.

#### Introduction

Vibration is usually caused by imbalance or misalignment. Both conditions have unique symptoms which can help troubleshoot the cause of vibrations.

#### **Imbalance**

Imbalance exists to some degree in all rotating parts and is characterized by a vibration at once per revolution. Imbalance occurs when the mass center of rotation is different from the center of rotation. Since the center of rotation can't be moved, to balance the mass, the mass center must be moved. This is accomplished by adding weight opposite the force produced by the imbalance. The larger the radius of the mass, the less mass is required to produce the same force. For example, adding 20 grams at 2 inches from the center is the same as adding 2 grams at 20 inches from the center.

#### Characteristics of Imbalance

The following are characteristics of imbalance:

- The vibration will occur at the rate of once per revolution
- The phase will be stable
- The amplitude of the imbalance force will increase with rotational speed

#### **NOTE**

A once-per-revolution vibration may not always be imbalance but could be a sign of another problem, such as mechanical looseness.

## Characteristics of Misalignment

Vibration due to misalignment is usually characterized by:

- Vibration at twice the running speed
- High levels of vibration in the fore and aft direction

# Types of Misalignment

Misalignment takes the following forms:

- Pre-load from a bent shaft or improperly seated bearing
- Offset of the shaft's centerlines

#### **NOTE**

Flexible couplings increase the capability to tolerate misalignment, however, they are not a cure for serious alignment problems.

#### Types of Main Rotor Blade Vibrations

Main rotor blade vibrations are usually characterized by high levels of once-per-revolution vibrations or at the blade passing frequency (number of blades times rpm).

## Types of Blade Problems

The following table lists several types of blade problems and the probable causes:

Problem	Probable Cause
Once-per-revolution vibrations in the plane of the rotor	Imbalance condition
Once-per-revolution vibrations out of the plane of the rotor	Out of track condition
Blade flies out of track from a hover to forward airspeed	Tabbing problems with the blade
Blade flies out of track from the ground to a hover	Blade chordwise weight problem

# Types of Hardware/ Component Problems

The problems listed in the table below all indicate possible faulty hardware/components or incorrect installation.

Problem	Troubleshooting Tip
Once-per-revolution problems that are <b>NOT</b> caused by imbalance or track	Troubleshoot only that hardware/component that will affect one blade
When attempting to balance/track, the phase becomes unstable before the specified limit is reached	Troubleshoot only that hardware/component that will affect one blade
High vibration levels at blade pass frequencies (2/rev, 3/rev, 4/rev, etc.)	Troubleshoot only that hardware/component that will affect all of the blades

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## Questions

Answer the following questions on Aircraft Vibration.

1.	List three of the effects that vibrations can have on the human body.  1)
2.	The stress and fatigue on aircraft and equipment can lead to
3.	List at least two of the goals of vibration analysis.  1) 2)
4.	In aviation, what unit of measurement does the Coast Guard use to measure vibration?
5.	What component of vibration measuring equipment functions as a pickup assembly that senses the movement of the component it is mounted to and produces a voltage proportional to acceleration?
6.	An imbalanced condition is characterized by a vibration at
7.	What is used to increase the capability of components to tolerate misalignment?
8.	High vibration levels at blade-pass frequencies (2/rev, 3/rev, etc) generally indicate what type of problems?

## Feedback

Compare your self-quiz answers with the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	List any three of the following:	3
	<ol> <li>Discomfort</li> <li>Fatigue</li> <li>Blurred vision</li> <li>Loss of balance</li> <li>Loss of concentration</li> </ol>	
2.	component failure	3
3.	List any two of the following:	4
	<ol> <li>Increase aircraft availability</li> <li>Reduce aircraft repair costs</li> <li>Improve aviation safety</li> </ol>	
4.	Inches per second (IPS)	5
5.	Accelerometer	5
6.	Once per revolution	6
7.	Flexible couplings	7
8.	Hardware or installation problems	8

Performance	TROUBLESHOOT aircraft components for excessive vibration.	
Performance Objective 1	Given an aircraft component vibration discrepancy and General Troubleshooting Guidelines, <b>PERFORM</b> a visual inspection IAW the General Troubleshooting Guidelines (section 5.B.GTG).	
Performance Objective 2	Given an aircraft component vibration discrepancy and necessary equipment, <b>PERFORM</b> an operational check of the applicable system or component IAW one or more of the following references:	
	HH-65A	
	• MPC Index, Chapters 62, 64, and 71	
	НН-60Ј	
	• MPC Index, Chapters 53, 62, 64, and 72	
	НС-130Н	
	• 1C-130H-2-61JG-10-1	
	• 2J-T56-56	
	HU-25A	
	• 2J-ATF3-2-1, Chapter 72 (Testing)	
	• 2J-ATF3-2-2, Chapter 72 (Testing)	
	• MPC Index, Chapter 71	
	Continued next nece	

**Syllabus** 

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5.B.30

# Enabling Objective 3

Given an aircraft component vibration discrepancy and necessary equipment, **ISOLATE** and **LOCATE** the vibration to the most probable component IAW one or more of the following references:

## **HH-65A** • 1H-65A-4 • 1H-65A-11-72-2B2 • 1H-65A-11-72-4B2 • MPC Index, Chapters 62, 64, and 71 **HH-60J** • A1-H65CA-150-100 and -400 • A1-H65CA-220-100 and -400 • A1-H65CA-260-100 and -400 • MPC Index, Chapters 53, 62, 64, and 72 HC-130H • 1C-130H-2-61FI-00-1 • 1C-130H-2-61JG-10-1 • 1C-130H-2-70FI-00-1-2 **HU-25A** • 2J-ATF3-2-1, Chapter 72 (Testing) • 2J-ATF3-2-2, Chapter 72 (Testing)

• MPC Index, Chapter 71

# Enabling Objective 4

Given an aircraft component vibration discrepancy and necessary equipment, **CORRECT** the malfunction IAW one or more of the following references:

## HH-65A \_\_\_\_\_\_

• MPC Index, Chapters 62, 64, and 71

#### HH-60J

• MPC Index, Chapters 53, 62, 64, and 72

#### HC-130H

• 1C-130H-2-61JG-10-1

#### HU-25A

- 2J-ATF3-2-1, Chapter 72 (Testing)
- 2J-ATF3-2-2, Chapter 72 (Testing)
- MPC Index, Chapter 71

# Enabling Objective 5

Given an aircraft system/component and necessary equipment, **PERFORM** a final operational check of the system/component to verify the vibration discrepancy has been corrected IAW one or more of the following references:

H	IH-65A	
•	MPC Index, Chapters 62, 64, and 71	
H	IH-60J	
•	MPC Index, Chapters 53, 62, 64, and 72	
H	С-130Н	
•	1C-130H-2-61JG-10-1	
•	2J-T56-56	
H	IU-25A	
•	2J-ATF3-2-1, Chapter 72 (Testing)	
•	2J-ATF3-2-2, Chapter 72 (Testing)	
•	MPC Index, Chapter 71	

#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the correct manuals used by the Coast Guard for air station shop safety programs.
- **STATE** the instructing policy on safety in the Coast Guard.
- **SELECT** the definition of acute exposure.
- **SELECT** the definition of chronic exposure.
- **DESCRIBE** the effects of dermatitis.
- **STATE** the responsibility of the technician in the Coast Guard respiratory protection program.
- SELECT the proper oxygen concentration required for the use of airpurifying respirators.
- **STATE** the approval ratings required for the respirators used in the Coast Guard.
- **STATE** the warning associated with the maintenance and repair of respirators.
- **STATE** who is responsible for the ultimate success of the hearing conservation program.
- **LIST** the symptoms of a person showing signs of over exposure to excessive noise
- **STATE** the first aid response for someone who is showing signs of over-exposure to excessive noise.
- **STATE** the decibel level at which hearing protection is required.
- **DEFINE** noise reduction rating (NRR).
- **STATE** the two conditions that must be present to result in an electrical shock.
- **STATE** the current flow that is usually considered fatal.
- **STATE** the meaning of secondary electrical injury.

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#### References

The information in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
- Technical Guide: Practices For Respiratory Protection, COMDTINST M6260.2 (series)
- Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
- First Aid and Health Lesson Plans, COMDTINST M6000.3(series)
- Electronics Manual, COMDTINST M10550.25
- The Coast Guardsman's Manual (Blue Jacket's Manual) current edition

Overview 5.D.01c

#### Introduction

The purpose of this assignment is to introduce you to general safety and your responsibilities as a Aviation Survival Technician. This assignment will also give you a basic understanding of general safety guidelines, available sources of information, individual, supervisor, and command responsibilities.

# Your Responsibility

As a Second Class Petty Officer you will have a hand in the training of both the Airman and AST3's, therefore it is your responsibility to familiarize yourself with the publications listed and learn from the information in this course to safely train your subordinates.

# In This Assignment

This assignment contains the following:

Subject	Page
Types of Aviation Maintenance Publications	5
Policy for Instructing Safety Lessons	6
Types of Eye Protection	7
Guidelines For Choosing Eye Protection	8
Cleaning Eye Protection	9
Personal Protection.	10
Shop Safety Practices	12
Chemical Exposure	14
Types of Poisoning	18
Coast Guard Policy On Respiratory Protection	19
Atmospheric Supply Respirator	21
Air-Purifying Respirators	23
Types of Test Ratings for Respirators	24
How to Conduct a Respirator Negative Pressure Fit Check	25
How to Conduct a Respirator Positive Pressure Fit Check	26
How to Conduct a Pre-Use Fit Check for Respirators	27

## In This Assignment (Continued)

Subject	Page
Respirator Care	. 28
Hearing Conservation	. 29
The Effects of Noise	.30
Hearing Protection Devices	.32
Noise Reduction Rating	. 34
Administering First Aid in a Shop	. 35
Eye Injuries and First Aid	.36
Electrical Safety	. 37
Facts About the Effects of Electrical Shock	.38
Types of Electrical Shock Injuries and Symptoms	. 39
Rescuing Electrical Shock Victims	.40
Electromagnetic Radiation (RF) Hazards	.41
General Shop Safety Self-Quiz	.43
Self-Quiz Feedback	. 49
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The following publications are used in the aviation maintenance safety programs and throughout the Coast Guard. Your ability to properly use and reference information within these manuals is integral to your job as an Aviation SurvivalTechnician and will help as a guide for preparing your training lecture.

### COMDTINST M13020.1 (series)

The Aeronautical Engineering Maintenance Management Manual, COMDTINST, M13020.1 (series) establishes shop safety standards and procedures for all Coast Guard aviation maintenance facilities. It contains information on basic shop safety practices and hand tool safety.

## COMDTINST M5100.47 (series)

The Safety and Environmental Health Manual, COMDTINST M5100.47 (series) is used throughout the Coast Guard and sets forth the policy and the elements of the Coast Guards safety program.

## COMDTINST M16478.1 (series)

The Hazardous Waste Management Manual, COMDTINST M16478.1 (series) prescribes policies and procedures for compliance with federal hazardous waste regulations for all Coast Guard ships and shore activities.

## COMDTINST M6260.2 (series)

The Technical Guide: Practices for Respiratory Protection, COMDTINST M6260.2 (series) provides the technical information necessary for the safe use of respiratory protection devices and requirements for administering the respiratory protection program.

## Coast Guardsman's Manual (current edition)

Other wise known throughout the fleet as the Blue Jacket's manual, this publication gives you an excellent overview of basic everyday safety and first aid used in the Coast Guard.

# Definition of Safety

Safety is the science and art devoted to the recognition, evaluation, and control of risk factors arising from man's environment which may cause injury, significant discomfort and inefficiency, property damage, or which could adversely affect the Coast Guard's mission capability.

#### Responsibility

You, as a member of the Coast Guard, have a personal responsibility to safeguard yourself and your fellow members as well as the government property entrusted to your care.

#### **Instructing Policy**

When instructing, only teach safety procedures and techniques that are 100% safe and IAW Coast Guard regulations.

## Common-Sense Questions

Common-sense is your best protection and safety device. Only you know your physical limits and demands that you can place upon yourself so, use your brain. Below is a list of questions you should ask yourself and teach others to ask prior to doing any job.

- Are there published guidelines for this task?
- Do I have the required safety equipment?
- Do I know what is expected from me?
- Can I accomplish this task without hurting myself?
- Can I accomplish this task without hurting others?
- Do I have the required skills needed to do the task?
- Do I have the required tools/materials to do the task?
- Do I have any unanswered questions?
- When in doubt, ask your supervisor.

Various types of eye protection, like tools, have a specific use for the job at hand. There is no one type of eye protection that can be used for all applications. Some applications might require you to use two types of eye protection at one time.

# Eye Protection and Their Descriptions

Listed below are some types of eye protection that all protect your eyes, but in different ways.

Name of Protection	Descriptions
Safety Glasses	Similar in appearance to eye glasses, they have a mesh screen around the lenses to protect from large chips.
Safety Goggles	Protect by wrapping around your eyes much like a mask, has small screens around to protect from small chips from entering
Safety Goggles (Liquid Use)	Protect by wrapping around your eyes much like a mask, but have small vents facing towards the back to prevent liquid from entering your goggles. This type is not to be used for grinding operations.
Face Shields	Used for covering your whole face, normally used for grinding operations and in conjunction with safety goggles.

# **Prescription Eye Glasses Warning**

Though most prescription glasses are impact resistant they are not of the same standard as safety glasses and will not offer the required protection.

## WARNING

Prescription eye glasses shall not be used as safety glasses. If you wear prescription eye wear, always put safety goggles or a face shield over your glasses.

# Methods For Choosing Eye Protection

Eye protection has only one function. That is to protect your eyes. When selecting eye protection ensure that the proper type of eye protection is selected for the task at hand. There are several factors involved in determining what type of eye protection devices should be used. They are as follows:

- Read the:
  - label of the product that you are using
  - Material Data Safety Sheet (MSDS)
  - maintenance manual or ACMS/MSR MPC
- If your work includes:
  - looking upwards at work surface
  - mixing, pouring, or moving liquids
  - grinding operations
  - compressed gas use

#### Guidelines For Pre-Use Checks

Eye protection should be inspected prior to use. The following checks will be done prior to donning the eye wear.

Check for the following characteristics:

- Proper protection for the job at hand (grinding, liquids etc.)
- Lens cleanliness
- · Lenses not scratched
- Strap or ear pieces intact
- Overall condition of the gear is in good repair (no lose hardware)

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AST2

Eye protection, to be effective, must be usable. If eye protection is not clean and in usable condition no one will want to use it and this can cause accidents or injuries.

#### **Cleaning Policy**

Eye protection shall be stored and cleaned IAW the manufacturers instructions and OSHA regulations.

# Cleaning Eye Protection

Eye wear should be clean before you put it on and cleaned after you are done using it. There are various types of cleaning solutions but use only the types that:

- Are compatible with the lens (no harsh solvents)
- · Have an anti-bacterial agent
- Have degreasing characteristics

## Stowage of Eye Protection

Properly stowing eye protection is every bit as important as cleaning. Eye protection is not cheap and if not properly stowed will render the eye protection useless. After properly cleaning the eye protection, stow it by:

- Hanging it on hooks
- Placing in a well ventilated cabinet/rack
- Placing the eye protection in the case provided by the manufacture

#### **NOTE**

Never place the eye protection so that it is resting on the lenses. This will cause undesired scratching and impair the optical quality of the eye protection.

Your attitude towards safety is important. A good positive attitude and outlook will allow you to do the following:

- Achieve a maintenance goal safely
- Accomplish your job without injury
- Also by you using the proper safety equipment and projecting a good attitude, you enforce the safety standards to your subordinates.

#### **Policy on Jewelry**

The wearing of any type of jewelry, metal or non-metallic, shall not be worn while working in the shop or on aircraft.

#### NOTE

Medical Alert identification bracelets/necklaces are exempt from this rule.

## Hazards of Jewelry

Jewelry can become caught on the side of the aircraft, snagged on machinery, or come in contact with live electrical circuits causing you to lose a finger, hand or become electrocuted.

## Examples of Jewelry

Listed below are some examples of jewelry.

- Bracelets
- Earrings
- Necklaces/dog tags
- Rings
- Watches

#### Policy For Wearing Head Protection

Hard hats or head protection should be worn during any overhead work (any work over eye level) while on the hanger deck, flight line, or in shops, during crane and forklift operations or any work under an aircraft where their is a chance of hitting ones head.

# Protective Clothing

Clothing is issued as protective gear for a variety of reasons. They can be issued due to:

- Extreme temperatures (either cold or hot)
- Welding
- Grinding
- Painting
- Fire fighting operations.

# **Care of Protective Clothing**

Protective clothing is only as good as the condition it is in. Always clean and store the gear IAW the applicable publications.

Housekeeping is essential to shop safety. By keeping your shop and work area clean and clear of debris, you can dramatically cut down on the chance of injury.

## Housekeeping Guidelines

Good housekeeping starts with a plan. Below is a list of general housekeeping guidelines that you should follow prior to starting a task. Always ensure that the:

- Work area is clean
- Work area is sufficient to accomplish the task
- Proper fire safety equipment is available
- Proper waste/spill containment is available
- Work area is properly lit

#### **Machine Safety**

In almost all survival shops within the Coast Guard there is some sort of machinery. Machine safety should be practiced by everyone who walks into a shop. Just because there is no loud noise associated with the machine, do not assume that it is off. There have been untold numbers of MISHAP reports from units stating that a person has been injured because of the "I thought it was secured" syndrome. Even though a machine has been secured, most machines require a long coast-down time to come to a complete stop.

# Electrical Hand Tool Safety

Ensure that all power tools are properly grounded and check that none of the following occur:

- · Frayed wire
- Bent prongs
- Split insulation
- Previous signs of arcing damage
- Flammable material or vapors are present

Continued Next Page

#### **Hand Tool Safety**

The use of hand tools causes more accidents annually than power driven tools. The main reason for this is the person using the tool. Often, the hand tool is being used for a purpose other than what it was designed for.

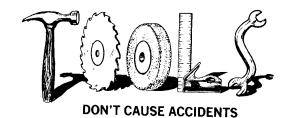
### Non-Example of Hand Tool Safety

Some of the more obvious examples are the screwdriver being used as the pry bar. On top of the fact that most manufacturers print the caution on the handle informing the user not to do this, it still gets done. Result, a broken screwdriver and a technician with a hole in the hand or a chip of metal in the eye. Not to mention the paperwork the supervisor has to submit to the safety officer.

#### **Don't Forget**

Use the proper tool for the proper job and the proper tool, properly. Below is a list of some basic hand tool safety practices. For a full in-depth discussion see the Aeronautical Engineering Maintenance Management Manual (M13020.1 (series).

- Do not throw tools from one person to the other
- Do not drop them down from one person to the other
- Do not carry them in your pockets
- Do not use defective tools





Due to the nature of the work of a survival technician, you are exposed to a bewildering array of chemicals. Chemicals are used every day from cleaning parts, aircraft, to floors. This section will introduce you to some of the more common problems associated with the effects of chemical exposure.

# **Definition of Acute Exposure**

Acute exposure is the result of exposure to excessive concentrations of a chemical, fume, or mist within a short time period.

# Example of an Acute Exposure

A technician was working in the fuel cell of a HC-130H when suddenly the technician started feeling dizzy, nauseous, and faint. This was presumably caused by the high concentrations of fuel vapors in the surrounding air and a possible leak in the technicians mask. Once removed from the area and breathing fresh air the technician was feeling fine.

# Definition of Chronic Exposure

Chronic exposure is the result of being repeatedly exposed to a chemical, mist, or fume for prolonged periods of time.

# Example of Chronic Exposure

A technician has worked the night shift for over eight months. With the fast-paced maintenance tempo, the technician decided putting on the proper hand protection seemed to be a waste of time while working with chemicals such as jet fuel and de-greasers, now the technician is constantly bothered with dried out itchy skin, the results of dermatitis.

# **Definition of Skin Absorption**

Your body can absorb chemicals through the skin. Chemicals that are absorbed through the skin can damage or burn your skin, damage your liver, kidneys, blood cells or nervous system. Knowing the chemical you are using, its effects and how to protect your self is important.

# Example of Skin Absorption

An example of skin absorption is the medical skin patches that are used for cigarette smoking cessation programs. This patch has a medication which permeates the skin and is absorbed into the blood stream.

# Definition of Dermatitis

Dermatitis is a condition in were the skin is red, swollen, and often cracked, usually caused by the skin being stripped from its natural body oils. Dermatitis can be an annoying and painful skin problem. Dermatitis is avoidable if you use the proper precautions.

# Example of the Effects of Dermatitis

An example of dermatitis is the effect upon your hands after washing an aircraft. The cleaner that you use has chemicals that are designed to remove grease, be it grease from the aircraft or the natural oils of your hands, it makes no difference to the cleaner. Result. Your hands feel dry and chapped due to the loss of natural oils in your hands.

## **Definition of Protective Gloves**

Since the chances of you getting dermatitis is increased by you being an AST, wear protective gloves whenever required. But just putting on any glove will not guarantee your safety. The proper glove for the type of exposure you will encounter must be used. Certain chemicals will deteriorate certain gloves. For the proper protection requirements read the MSDS.

# Example of Correct Protective Gloves

You were assigned to re-glue some velcro on the airframe of a HH-65A. The maintenance manual tells you use hand protection from the glue. While reading the MSDS, latex surgical gloves are the type of hand protection recommended.

# Example of Incorrect Protective Gloves

Your are assigned to take fuel samples on an aircraft. You get a pair of surgical gloves from your shop instead of those heavy rubber fuel resistant gloves next the fuel sampling gear. While you are taking the fuel samples, fuel drips on the latex gloves and begin to swell and they fall apart in a matter of minutes, leaving you with no protection.

# **Testing Rubber Gloves**

Prior to putting on any rubber, latex, or plastic protective gloves, you should ensure that they are free from holes, tears or cuts.

### Rationale

The reasoning is simple, if there is a hole in the glove the liquid can enter, and the purpose of the glove has been defeated.

## Procedure for Testing Rubber Gloves

To check your glove, follow the steps below.

Step	Action	
1.	Hold glove at each side of the edge of the gauntlet.	
	Tun F	
2.	Revolve it about the edge of the gauntlet as an axis, thus rolling it towards the palm and fingers.	
	Jan 19	
3.	Hold the rolled-up gauntlet tightly in one hand.	
4.	Squeeze the palm of the glove with the other hand as to put the confined air under pressure (gently, as not to pop the glove)	
5.	If any puncture exists, you will detect it by the air escaping or the hole will be visible.	
6.	If there is a hole, don't use the glove, and get another pair.	

Poisoning can happen to you in many ways in the work area, but some of the most frequent causes are from ingesting (eating, swallowing) and inhalation (breathing) of the poisoning.

#### Ingestion

One of the most over looked and yet common forms of poisoning is ingestion poisoning. The chemicals that you are using can be splashed into your mouth while washing airplanes, cleaning components, having dirty hands, or by the most frequent method, eating around a work area. Ingesting caustic or poisonous chemicals can burn or damage your mouth, esophagus, lungs, liver, or stomach.

### How to Avoid Ingestion Poisoning

By taking a few common sense precautions you will be able to avoid ingestion poisoning. Such as:

- Do not eat around a work area
- Ensure that your hands and arms are cleaned with soap and water and dry
- Clean you face from oils, chemicals, dust and particles
- Also ensure that you remove your coveralls or any other protective clothing that you are wearing before entering your eating area

#### Inhalation

Every time you breathe, you inhale some type of chemical, and in a shop situation this can be dangerous. Solvents, paints, chromate's, dust, and fumes can cause a variety of health problems. Your best protection from this is using the proper respiratory protection. Look in the MSDS for the required type of protection.

The use of respirators in the Coast Guard is mandatory for any work that might affect the respiratory system. Respirators are used in operations ranging from gluing, cleaning, to painting. Each type of respirator has a specific filtering function. Filters are not universal in their filtering capabilities. Each type of filter is designed for certain types of chemicals and environmental conditions.

# Guidelines For Selecting

For selection of the proper filter read the MSDS for the chemical or the technical order/ACMS MPC for the job at hand. When in doubt, ask your supervisor or the Respiratory Program Coordinator at your unit for guidance.

## Respiratory Program Coordinator (RPC)

The Respiratory Program Coordinator (RPC) is responsible for the following actions:

- The correct respirators are used IAW NIOSH/MSHA standards.
- Self contained and supplied air systems deliver air which meets breathing air standards.
- Periodically observes and evaluates the actual use of respirators by unit personnel.

## 5.D.01c Coast Guard Policy On Respiratory Protection

## (Continued)

### Responsibility of The Supervisor

It is the supervisor's responsibility to assure the proper use of respirators during operations or activities and that the respirators are:

- Available
- Cleaned
- Maintained properly
- Stowed properly after use

## Responsibilities of The Technician

It is the responsibility of the technician to use the provided protection IAW the instructions and training received and to do the following:

- Inspect the respirator before and after each use.
- Report to the supervisor situations which may require respirator use and those in which respirators are not being used as required.
- · Clean and maintain respirators as directed
- Stow properly after use

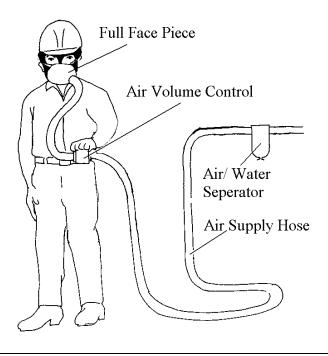
There are various types of respirators used in aviation today. Choosing the proper respirator for the task at hand is extremely important

## Categories of Atmospheric Supply Respirator

Atmospheric supply respirators have their own air source or supply of air into the respirator face piece. These types of respirators are used in spaces that have little or no clean, breathable air in the compartment (like fuel cells and paint booths). There are two categories:

- Self-contained breathing apparatus (SCBAs) which supply air from a source (typically a cylinder) carried by the user.
- Supplied-air respirators (SARs) which supply air from a source (usually an air compressor) located some distance away and connected to the user by an air supply hose.

Illustration of a Supplied Air-Respirator Below is an illustration of a typical supplied-air respirator.



# Parts Function Table

Below is a parts function table for the atmospheric supply respirator.

Parts	Functions
Full Face Piece	Covers the whole face of the wearer and offers limited eye protection
Air Volume Control	Regulates air-flow to the mask
Air Supply Hose	Provides clean filtered air to the user from the supply source
Air/Water Separator	Separates the water from the air to proved the user with dry air

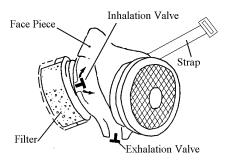
Air-purifying respirators do not have a separate air source. The respirators draw ambient air across a filter or purifying cartridge before the air enters the face piece.

#### WARNING

Air-purification filters will be used only where the oxygen level concentration is 19.5% or higher

## Diagram of an Air-Purifying Respirator

Below is a view of a typical air-purifying respirator used within the Coast Guard today.



# Parts Function Table

Below is a parts function table for the above air-purifying respirator.

Part	Function
Filter	Filters out contaminates
Face piece	Provides sealing surface between the face and the filter
Strap	Holds the face piece snugly in position
Exhalation Valve	Exhaled air escapes without letting contaminated air in
Inhalation Valve	Located behind the filter, this one way check valve allows filtered fresh air in and closes while the user exhales

Respirators do not work properly unless they fit the wearer. The quality of the respirator fit is determined by the seal where the respirator meets the wearer's face.

# Approved Types of Respirators

Approval ratings required for all respirators used in the Coast Guard are provided by the following organizations:

- Mine Safety and Health Administration (MSHA)
- National Institute for Occupational Safety and Health (NIOSH)

# Definition of Fit Testing

The fit test is performed by using a small smoke irritant such as isoamyl acetate, or saccharin solution and gently waving it around the mask. The user should not be able smell the offending chemical if the respirator is properly fitted.

#### **Policy For Fit Test**

All personnel who use air-purifying respirators shall undergo a respirator fit test.

## How to Conduct A Respirator Negative Pressure Fit Check 5.D.01c

## Negative Pressure Check

The negative pressure check is used to see if the wearer has a properly fitted respirator. This shall be done every time the respirator is placed on the face prior to being exposed to the hazard.

## Negative Pressure Check Procedures

To properly accomplish a negative pressure check use the following procedures:

Step	Action
1.	Properly place respirator on your face.
2.	Tighten the face piece straps snugly.
3.	Cover the filtering cartridge inlet with the palm of your hands (air-purifying) or pinch the hose (air-supplied).
4.	Gently inhale and hold your breath for about 10 seconds.  The mask should squeeze against your face and hold a vacuum (if not start over at step 1).

## 5.D.01c How to Conduct A Respirator Positive Pressure Fit Check

# **Positive Pressure** Check

This check is used on respirators equipped with tight fitting face pieces which contain both inhalation and exhaust valves such as the self-contained breathing apparatus.

## Positive Pressure Check Procedures

To properly accomplish a positive pressure check use the following procedures:

Step	Action
1.	Secure the source of air
2.	Properly don the face piece
3.	Tighten the face piece straps snugly
4.	Cover up the exhaust valve with the palm of your hand or pinch the tube closed
5.	Exhale gently for at least 10 seconds. The mask should bulge out slightly with no escape of air (if not start over at step 1.

# **Purpose**

The purpose of the daily fit check or pre-use check is to ensure that the respirator is in good working order prior to doing any work.

# Pre-use Checks Procedure

These checks shall be performed before putting on the respirator each time that it is worn. Examine the face piece for:

Step	Action
1.	Excessive dirt (clean if required)
2.	Cracks, tears, holes or physical distortion
3.	Inflexibility of rubber face piece
4.	Cracked or torn check valves
5.	Straps in good repair
6.	Filter cartridge holder('s) not damaged, gaskets in place
7.	Choose correct filter for the task at hand (see MSDS)
8.	Filter is installed correctly
9.	Pressure test the face piece (negative or positive testing)

Respirator care is an essential part of this program. Without the proper care and cleaning of respirators, they will be rendered useless.

# Maintenance and Repair

Maintenance and repair of respirators must be done by thoroughly trained personnel.

### WARNING

Do not interchange replacement parts between different brands or manufacturers. Such substitutions of parts or modifications will invalidate the MSHA/NIOSH approval of the respirator.

# Reason for Cleaning

Use of the respirator results in the exterior surface becoming dirty and/or contaminated. The interior surface is exposed to sweat and other body secretions which can, over a period of time, cause dermatitis. In addition, the use of the same respirator by different people may lead to the transmission of skin conditions between wearers and/or dermatitis.

### Cleaning Guidelines

Follow the manufactures recommendations for disassembly and cleaning. If they are not available use the cleaning guidelines published in the Technical Guide: Practices For Respiratory Protection, COMDTINST M6260.2 (series).

# Storage Policy for Respirators

After the respirators are cleaned they must be stored properly. Store respirators:

- In a clean, dry location
- Away from direct sunlight
- Separated from chemical contaminates
- Placed in clean plastic bags until re-issue
- In a single layer with the face piece and the exhalation valve in an undistorted position to prevent rubber or plastic from distorting

The Coast Guard's living and working environment contains many high intensity noise sources. Exposure of personnel to such noise, damages hearing and creates major health and fiscal impacts on the Coast Guards resources, resulting in reduced mission capability.

### Definition of Hearing Loss

The ear responds to excessively loud noise over time, with the high pitch of hearing affected first. Therefore, early hearing loss is not noticeable and may go undetected by the individual for many years.

### Consequences of Loud Noise

If the noise level to the ear is not decreased, a person will eventually loose the ability to hear speech. This damage is permanent.

# Personal Responsibility

Ensuring that the hearing conservation program is successful is shared by the individual and the various levels in the Coast Guard organization. Ultimately the success of the hearing conservation program is your responsibility. You are always responsible for the following:

- Always practice good hearing conservation both at work and at home.
- Notify your supervisor of any unhealthy or unsafe working conditions or noise hazards.

# Definition of Noise

Noise is "sound without value." It is the phenomenon of sound waves moving through air in much the same way ripples travel on an undisturbed pond.

# Definition of Decibel

Intensity of sound is commonly known as loudness and is measured in units called decibels dB(A). A zero on the decibel scale represents the lowest limit of human audible perception; the level of normal conversation is approximately  $60\ dB(A)$ .

Noise is a part of everyday life and comes from a myriad of sources. The most thought of noise sources are often associated with that of an industrial source.

# Examples of Common Noise Sources

An example of common noise sources are hanger decks, flight lines, or in an aircraft. In reality you have the same risk, if not more, in a home environment. Noise from you lawn mower, chain saw, weed eater, and yes, even your stereo CD player with head phones.

## Psychological Effects of Over Exposure to Noise

Noise can cause a lot of physical problems with you and your health. The severity of the problems depends on the level and the duration of exposure. Without proper hearing protection, the following symptoms can be caused by noise.

- Light headedness
- Dizziness
- Headaches
- Fatigue
- Dilation of blood vessels
- Rise in blood pressure
- Change in heart rate
- Nauseous
- Rise in the blood cholesterol level

# First Aid for Over Exposure to Noise

If you notice anyone showing signs of over exposure to noise immediately remove them from the noise and get medical help ASAP.

# Long term Effects of Noise

Long term exposure can cause permanent and often non-reparable damage to your ear. This can not only affect your health, but your career.

# Hearing Conservation Program

This program is used to continually monitor a member who shows signs of hearing loss. When placed on this program, and there is no substantial improvement in your hearing within a prescribed time you can be grounded indefinitely. For further information and details see your medical department. Do not take chances. Wear the prescribed hearing protection.

Hearing protection devices come in a wide variety of shapes and designs but they have the same goal, to lower the input of noise to your ear.

# Types of Hearing Protection

Each type of hearing protection is rated at different NRR, so it might be necessary to wear two sets of different types of protection. Ear protection comes in the following forms:

- Foam ear plugs
- Rubber (double, triple) flanged plugs (must be fitted by medical department)
- Formed plastic ear plugs (see the medical department)
- Head sets (commonly called Mickey Mouse ears)

# Ear Protection Charts

Ear protection is required whenever you know you will encounter noises ?84 dB(A). The higher and longer the duration that you encounter, the more protection you will need. Follow the below chart for your hearing protection needs.

dB(A)	No Protection	Protection Time
?84	0 Seconds	Unlimited
?100	0 Seconds	Unlimited
?104	0 Seconds	Double hearing protection required after ?104
?110	0 Seconds	Unlimited
?120	0 Seconds	4 Hours MAX
?130	0 Seconds	1 Hour MAX
?140	0 Seconds	5 Minutes Max

# Correct Ear Plug Placement

The proper insertion and placement of ear plugs is important for them to offer optimal protection. Read the manufacturers instructions prior to using the ear plugs.





# Double Hearing Protection

It is always a sure bet to error on the side of safety and wear double hearing protection. The wearing of ear plugs and head sets will offer the best first line of protection. Do not take a chance with your hearing.

The purpose of hearing protection is to lower the input of noise into your ear. To accomplish this, the protection device is made of material which absorbs sound waves. The various materials used, absorb sound waves at different rates.

# Definition of Noise Reduction Rating (NRR)

The noise reduction rating (NRR) is what determines the effectiveness of the hearing protection. The NRR is shown on the package that the hearing protection comes in. This number will help you to determine if the hearing protection that you have chosen is adequate or if you need to augment the protection. The higher the NRR the better hearing, the protection offered.

#### **NRR Example**

The noise reduction rating (NRR) of hearing protection is simply figured out by finding out the decibel rating (or reading) and subtracting the NRR of the hearing protection that you have chosen. For instance, the decibel rating for a paint both was calculated at  $95 \, \mathrm{dB}(A)$  by the an industrial hygienist. The ear plugs that your shop normally uses have a NRR of 30  $\, \mathrm{dB}(A)$ .

100 dB(A) Salvage Pump noise rating
- 30 dB(A) NRR Ear plugs
70 dB(A) Hearing exposure level to you

This is well below the ?84dB(A) rating, which means you have good hearing protection for the task at hand.

### **Purpose**

First Aid consists of emergency treatment of an injured or wounded person. The purposes of first aid are to:

- Save the victim's life,
- Prevent further injury or unfavorable progression, and
- Preserve the vitality and resistance to infection.

# Basic First Aid Procedures

The Coast Guard has trained you in basic first aid IAW the Syllabus of First Aid and Lesson Plan, COMDTINST M6000.3 (series) and you as a member of the Coast Guard and as a shop supervisor should know these procedures. There are three basic steps in first aid that you should remember. If you find a victim in need of first aid perform the following steps:

Step	Action
1.	Call or send for help
2.	Remove the cause or the victim from the cause.
3.	Perform the ABC'S:
	Airway: ensure that the airway is clear
	Breathing: verify whether the victim is breathing
	Circulation: check for pulse and stop major bleeding, perform CPR if required
	Shock: check for and treat for shock as required
4.	Seek medical treatment immediately, and/or report the injury to the unit Safety Officer.

### First Aid Treatment Rationale

*Never hesitate* to get medical care as soon as possible or call for assistance. You are not a doctor. No one has ever gotten in trouble for playing it safe, let the doctors make the judgment call.

The eye can be injured in many ways. Eye injuries range from impact to intrusion of a chemical or an object. With any eye injury seek medical help as soon as possible.

#### Intrusion

This is the most common type of an eye injury in an industrial area. The eye is injured from a particle or an object that punctures the eye or creates a deep scratch.

#### WARNING

Never attempt to remove an object embedded into the eyeball or has penetrated through the eyeball. Seek medical help immediately.

### Splash

This eye injury is caused by a chemical being splashed into the eye. This often occurs while washing aircraft or while using solvents in a parts cleaning tank. Read the MSDS or the label on the container for further instructions on how to flush the eye. When taking someone to medical, if at all possible, take the container with you.

#### WARNING

Flush the eye out immediately for at least 15 minutes with fresh clean water away from the nose to prevent flushing the chemicals into the unaffected eye. Seek medical help immediately.

As an AST you will have to work with or around electrical equipment, therefore it is essential that you have an understanding of basic electrical safety. All electrical or electronic equipment should be considered dangerous with the potential to kill. It is impossible to cover every safety situation that you may encounter on the job.

## Personal Responsibilities

It is your responsibility to familiarize yourself with the electrical safety guidelines and practices located in the Electronics Manual, COMDTINST M10550.25 (series).

# Intentional Electrical Shock

Never intentionally give yourself an electrical shock from a battery, capacitor, or a megger (a low voltage output power supply).

### Definition of Electrical Shock

An electrical shock is the result of a person coming into contact with an energized electrical wire or circuit and resulting in a flow of electrical current through the body. The severity of the shock is based on many factors which add to or subtract from it's intensity.

# Example of Electrical Shock

The following is an example of a victim who received an electrical shock. A technician working on a sewing machine motor who did not disconnect the power cord, soon found out that bridging the gap of the motors positive cable by accidentally grounding it to the metal frame of the machine makes for a painful reminder.

### Conditions For an Electrical Shock to Occur

There are two conditions that must be present in order for current to flow through an individual's body resulting in an electrical shock. They are as follows:

- First, some part of the body, must form part of a closed circuit.
- Second, there must be a difference in potential to cause current to flow through the circuit.

Current flow depends on the electrical resistance of the circuit path through the victim's body. Human skin resistance can range from a few hundred ohms when wet, to well over 500,000 ohms when dry.

In order for your body to register an electrical shock, there must be some current flow.

# Electrical Shock and Current Relationship

The table below shows the general effects of current flow through the human body.

Current in milliamperes	Effects on the body
0	None
3	Mild tingling
10	Painful (gets your attention)
25	Very painful (you can't let go)
60	Severe (breathing difficulty)
140	Usually fatal (heart twitches)
200	Burning odor (heart clamps)

Electrical shock is an ever present yet avoidable aspect of working on aircraft. Unfortunately, the occasional accident happens, and you need to be prepared.

### Signs and Symptoms of a Serious Electrical Shock

The victim of a serious electrical shock may have any or all of the following signs or symptoms:

- Burns where the current flow entered and/or exited the body
- Nerve damage (paralysis)
- Muscle tenderness and or twitching
- Breathing difficulty (the tongue may swell and obstruct the airway)
- Irregular heartbeat or cardiac arrest
- Blood pressure may be elevated or lowered
- Restlessness/irritability or loss of consciousness
- Visual difficulties
- Seizures
- Secondary injuries (cuts, bruises, broken bones, etc.)

### Secondary Electrical Injuries

Often, secondary injuries are sustained from an electrical shock as a result of surprise, and are sometimes in themselves fatal. Such as:

- Burns
- Falling off work stands
- Thrown into another live circuit

### **Purpose**

Personnel suffering from electrical shock must be removed from the hazard as soon as possible. Depending on the amperage or the duration of the electrical shock, the chances of the victim's survival is in your hands. Acting quickly and ensuring your safety is essential to you and the victim.

Guidelines for Rescuing Electrical shock Victims Secure the source of power to the electrocution victim. If this is impossible, do the following when rescuing electrical shock victims:

### WARNING

High amperage can cause the victim to hold on to the source of power. Do not touch the victim without securing the source of power or without using *DRY* rescue equipment

Step	Action
1.	Call, or send for help
2.	Remove the cause or the victim from the cause by securing the power or using a suitable dry non-conductive object (wooden cane or dry blanket).
3.	Check for ABC' S  • Airway  • Breathing  • Circulation  • Shock (treat if necessary)
4.	Seek medical treatment immediately, and/or report the injury to the unit Safety Officer.

Electromagnetic radiation( RF) from radar, and communication transmitters are hazardous and cause undesirable effects under certain conditions.

# Categories of Radiation Hazards

Generally, these radiation hazards fall into one of the following categories:

- Induced Voltage Effects
- Personal Biological Injury

# Personal Biological Injury

When electromagnetic energy is absorbed by human tissues, heat is produced. The body cannot dissipate this heat as fast as it is produced, therefore the internal temperature of the body will increase causing damage to tissue and internal organs.

# Example of Biological Injury

Microwave ovens demonstrate perfectly how energy is absorbed by biological tissue. Though there is no heat transferred from the electronics source to the tissue, the tissue absorbs the energy and heats up internally. This is fine for ground round, but not so good for living human tissue.

#### **RF Sources**

RF sources come from various aircraft and hanger equipment. They are:

- High Frequency antennas (HF)
- Radar dishes
- Side Looking Airborne Radar (SLAR)

# 5.D.01c Electromagnetic Radiation (RF) Hazards (Continued)

# Signs of RF Exposure

While working on the hanger or out on the ramp you could be inadvertently exposed to RF radiation. Some of the most common signs of RF exposure are:

- Your eyes have the sensation of having sand in them
- Skin starts tingling (cooking)
- Skin starts feeling warm
- Electrical shock (if you touch the antenna)

#### **NOTE**

If you have been exposed to, or think you have been exposed to RF radiation, seek medical help at once.

### Body Organs Most Sensitive to RF Radiation

Exposure to RF radiation can have damaging, long lasting, and even permanent damage to your body. The most RF sensitive organs of the human body are the:

- Eyes
- Testicles

# Questions

Answer the following questions on General Shop Safety.

State the manual used to establish safety standards and procedures all Coast Guard aviation maintenance facilities		
State the policy on instruction	ng, the subject of safety in the Coast	
Guard.		
Match the name in column a column B. Use each letter	A with the appropriate statement in only once.	
	11 1	
column B. Use each letter  Column A  1. Acute	only once.	
column B. Use each letter <u>Column A</u>	only once.  Column B  a. Repeated exposure for	
column B. Use each letter  Column A  1. Acute	only once.  Column B  a. Repeated exposure for prolong periods of time.	

Questions (continued)	4. Describe the effects of dermatitis on your skin.
	5. State the responsibility of the technician in the Coast Guard respiratory protection program.
	<ul> <li>6. When wearing an air-purification respirator you must ensure that they are being used in areas where the oxygen concentration is percent.</li> <li>A. 5</li> <li>B. 9</li> <li>C. 19.5</li> <li>D. 29.92</li> </ul>
	<ul> <li>7. All respirators used in the Coast Guard must meet the requirements of what organization(s).</li> <li>a.)</li></ul>
	of respirators.

Questions
(continued)

9. '	Who is ultimately responsible for the success of the hearing conservation program?
10.	List the symptoms of a person who has been exposed to excessive noise?
	a.)
	b.)
	c.)
	d.)
	e.)
	f.)
	g.)
	h.)
	i.)
11.	If a person is showing signs of being over exposed to noise what should your first aid response be?
12.	At what decibel level is hearing protection required?

Questions (continued)	13. Define: Noise reduction rating (NRR).
	<ul><li>14. What two conditions must be present to result in electrical shock?</li><li>a)</li><li>b)</li></ul>
	15. What current flow is usually considered fatal?
	16. What is a secondary electrical injury?

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### **Feedback**

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answers	Reference
1.	Coast Guard Aeronautical Engineering Maintenance Management Manual COMDTINST M13020.1 (series)	5
2.	When instructing, only teach safety procedures and techniques that are 100% safe and IAW Coast Guard regulations	6
3.	1. c	14
	2. a	
4.	Your hands feel dry and chapped due to the loss of natural oils in your hands.	15
5.	It is the responsibility of the technician to use the provided protection IAW the instructions and training received	20
6.	С	23
7.	<ul><li>a) Mine Safety and Health Administration (MSHA)</li><li>b) National Institute for Occupational Safety and Health (NIOSH)</li></ul>	24

# 5.D.01c General Shop Safety Self-Quiz Feedback (Continued)

# Feedback (continued)

This is a continuation of the feedback table on the proceeding page.

Question	Answer	Reference
8.	Do not interchange replacement parts between different brands or manufactures. Such substitutions of parts or modifications will invalidate the MSHA/NIOSH approval of the respirator	28
9	Ultimately the success of the hearing conservation program is your responsibility.	29
10.	Light headedness	30
	• Dizziness	
	Headaches	
	Fatigue	
	Dilation of blood vessels	
	Rise in blood pressure	
	Change in heart rate	
	• Nauseous	
	Rise in blood cholesterol	
11.	Immediately remove them from the noise and get medical attention ASAP	31
12.	?84 dB(A)	33
13.	Determines the effectiveness of hearing protection.	34

# Feedback (continued)

This is a continuation of the feedback table on the proceeding page.

Question	Answer	References
14.	<ul><li>a) Some part of the body must form part of a closed circuit.</li><li>b) There must be a difference in potential to cause current to flow through the circuit.</li></ul>	37
15	140 milliamperes	38
16.	Injuries that are sustained from electrical shock as a result of surprise, and are sometimes in themselves fatal	39

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Syllabus 5.D.01c

#### Performance

INSTRUCT personnel in shop safety procedures.

# Performance Objective 1

Given the applicable publications, **PREPARE** a lesson plan on shop safety IAW:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
- Technical Guide: Practices For Respiratory Protection COMDTINST M6260.2 (series)
- Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
- First Aid and Health Lesson Plans COMDTINST M6000.3(series)
- Military Requirements For Becoming a Senior Petty Officer MRNSPO 0458 (series)

# Performance Objective 2

Given the applicable publications, **PRESENT** training on general shop safety IAW the Military Requirements For Becoming a Senior Petty Officer MRNSPO 0458 (series)

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **DEFINE** the term "eddy currents".
- **DESCRIBE** the nature of eddy currents.
- **STATE** how the magnetic field is generated during eddy current testing.
- LABEL the parts of an eddy current generation diagram.
- **DESCRIBE** how flaws are detected when eddy currents are induced into metal.
- **MATCH** the following eddy current test instrument components with their function:
  - Oscillator
  - Test Coil
  - Bridge
  - Signal Processing Circuits
  - Readout
- MATCH the following types of signal processing circuits with their function:
  - Amplifying
  - Filtering
  - Phase detection and Phase discrimination
- **MATCH** the following eddy current test instrument functions to their descriptions:
  - Generating
  - Receiving
  - Displaying
- **STATE** the criteria for eddy current test instrument selection.
- **STATE** the caution to follow when using eddy current test instruments.

# Objectives (Continued)

- **STATE** the warning to follow when performing an eddy current inspection.
- **LIST** the safety hazards to eliminate prior to starting an eddy current inspection.
- **LIST**, in order, the three general performance steps of an eddy current inspection.
- LIST the general cleaning guidelines for cleaning an inspection area
- **STATE** the proper scanning technique for a test area.
- **IDENTIFY** the definitions of the following terms:
  - Probe wobble
  - Lift-off
- **LIST** the causes of lift-off.
- **STATE** the meaning of the following meter needle deflections:
  - Sharp
  - Minor
- STATE the caution to follow when interpreting meter readings.

### References

The information contained in this assignment can be found in the following references:

- Nondestructive Inspection Methods, AFTO 33B-1
- Nondestructive Inspection Procedures, AFTO 1C-130A-36
- Eddy Current Tester, AFTO 33B2-9-1
- Flaw Detector, Eddy Current, AFTO 33B2-7-11

Overview 5.D.01

#### Introduction

This reading assignment is an introduction to eddy current theory, equipment, and general inspection procedures. Always refer to the applicable maintenance publications to perform eddy current inspections.

### How to Attend Advanced Training

Advanced eddy current nondestructive inspection training is available. See the Leading Chief Petty Officer at your unit for more information if you are interested in attending this training.

# In This Assignment

This assignment contains the following:

Subject	Page
Introduction to Eddy Currents	4
Eddy Current Inspection System Components	5
Test Instruments.	7
Test Instrument Example 1	8
Test Instrument Example 2	9
Eddy Current Inspection	10
Step 1: Clean the Inspection Area	11
Step 2: Inspect the Test Area	12
Step 3: Evaluate the Test Results	15
Eddy Current Inspection Application	16
Eddy Current NDI Self-Quiz	17
Eddy Current NDI Self-Quiz Feedback	24
Syllabus	27

### Definition of Eddy Currents

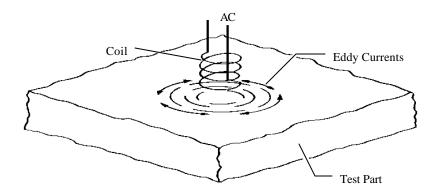
Eddy Currents are electrical currents induced in a conductor of electricity by reaction with a magnetic field.

# Nature of Eddy Currents

Eddy currents are circular in nature, and their paths are oriented perpendicular to the direction of the applied magnetic field. In general, during eddy current testing, the magnetic field is generated by an alternating electrical current (AC) flowing through a coil of wire.

### Eddy Current Generation Diagram

The following diagram shows the generation of eddy currents:



#### Flaw Detection

When eddy currents are induced in a metal in the region of a crack or other flaw, the eddy current flow is distorted. The distortion results in a change of magnitude and distribution of the eddy currents. By monitoring the changes in eddy currents, the presence of cracks or flaws can be established.

#### Components

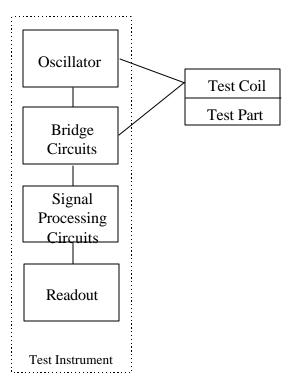
In its simplest form, the eddy current test instrument consists of the following components:

- Oscillator
- Test Coil (probe)
- Bridge Circuit
- Signal Processing Circuits
- Readout

Except for the test coil, all these components are integral to the test instrument.

### Inspection System Block Diagram

The following is a block diagram of the eddy current inspection system:



# 5.D.01 Eddy Current Inspection System Components (Continued)

#### Oscillator

The oscillator provides an alternating current or specified frequency range to the test coil. The frequency used is based upon the intent of the inspection and the type of the material being inspected. Frequencies for eddy current inspection may vary from less than 100 Hz to greater than 6 MHz.

#### **Test Coil (Probe)**

The test coil (probe) serves to introduce a varying magnetic field into the part being inspected. In addition, this same coil usually functions as a detector of changes in eddy current flow. Test coils may vary widely in size and shape as required for the application.

### **Bridge Circuit**

The bridge circuit converts changes in eddy current magnitude and distribution into signals for subsequent processing and display. A change in current flowing through the test coil unbalances the bridge circuit. This action is relayed as a signal to the subsequent circuits.

### Signal Processing Circuits

The processing of the signal from the bridge circuit depends on the type of information to be displayed. The following table shows the function of different types of signal processing circuits:

Circuit Type	Function
Amplifying	Employed in all eddy current units to increase the strength of the signal for readout.
Filtering	Suppress unwanted signals from conditions for which inspection is not required.
Phase detection & phase discrimination	Eliminate, separate, or analyze the response of various specimen properties and test conditions.

#### Readout

The common form of eddy current signal display is the meter. Most small, portable units present information in this manner.

Test Instruments 5.D.01

### Purpose

Eddy current test instruments are used at air stations to locate cracks and crack-like defects in aircraft parts.

### **Description**

Eddy current test instruments have the following common physical characteristics:

- compact
- self-contained
- lightweight
- portable

# Test Instrument Functions

The following table shows the three basic functions of an eddy current test instrument:

Function	Description
Generating	Provides an alternating current to the test coil.
Receiving	Processes the signal from the test coil to the required form and amplitude for display.
Displaying	Displays the test results visually and/or audibly.

#### Other Names for Test Instruments

Eddy current test instruments are also referred to by other names such as flaw detector, test unit, or tester.

# Test Instrument Use

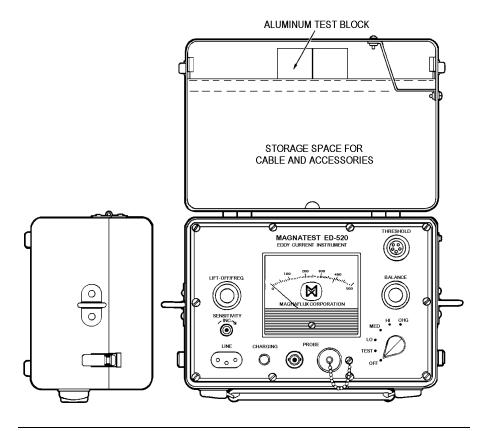
The aircraft type and inspection application will determine the eddy current instrument to be used.

#### **CAUTION**

Improper use of the eddy current test instrument may produce inaccurate readings and result in a flawed component remaining on an aircraft. Always follow the step-by-step set up and operating procedures listed in the applicable aircraft maintenance publications when using eddy current test instruments.

## Magnaflux Model ED-520

The following example shows a Magnaflux model ED-520 eddy current test instrument:

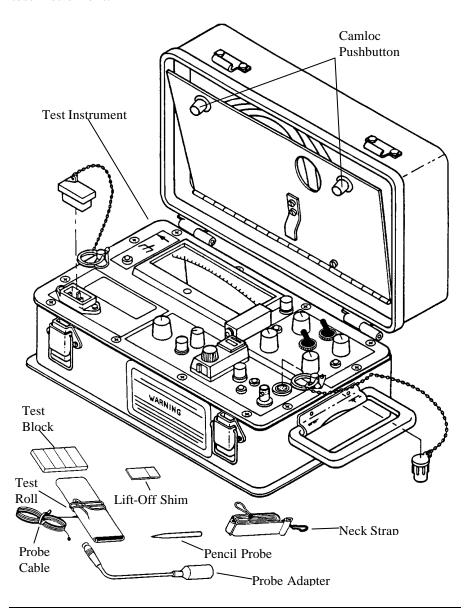


# For More Information

For more information about the Magnaflux model ED-520 Eddy Current test instrument refer to AFTO 33B2-9-1 (NAVAIR 17-15C-136).

# Hocking Model UH-B

The following example shows a Hocking model UH-B eddy current test instrument:



## For More Information

For more information about the Hocking model UH-B Eddy Current test instrument refer to AFTO 33B2-7-11.

Eddy current inspection is effective for the detection of surface or near surface cracks in most metals. The method can be applied to airframe parts or assemblies where the inspection area is accessible for contact by the eddy current probe.

#### Safety Precautions

Safety precautions for eddy current testing will always be stated in the applicable maintenance publication. The following are examples of some general precautions commonly found.

#### WARNING

Electrical equipment shall not be operated in areas where combustible gases or vapors may be present, unless the equipment is explosion proof.

Prior to conducting an eddy current inspection, survey the general area in advance to eliminate possible hazards created by:

- loose structures
- support equipment
- electric cords
- toxic fluids
- fumes

## **Eddy Current Inspection Steps**

The following table lists the general steps for performing an eddy current nondestructive inspection.

Step	Action
1	Clean the test area.
2	Inspect the test area.
3	Evaluate the test results.

Prior to inspecting an area, the area must be cleaned. The cleaning technique to be used will be determined by the type of foreign matter present and whether the part is plated, painted, or has a protective coating.

The applicable maintenance publication for a given eddy current inspection procedure will provide the specific guidelines to prepare an inspection area for testing.

### General Cleaning Guidelines

The following list states general guidelines that should be followed when cleaning an eddy current inspection area:

- Remove all foreign matter and corrosion.
- When removing protective coatings, use a method that will not affect, cause damage, or mask any defects.
- Do not use cleaning methods which mechanically abrade the surface of the area to be inspected since this may cause damage or mask the surface of the area.
- Mask off areas that may be damaged by contact with removal solutions or mediums.

Inspecting a test area consists of instrument calibration and proper scanning techniques.

### Test Instrument Calibration

Calibration is the standardization of the test instrument, prior to testing, to a known reference value. This is accomplished by following the step-by-step procedures outlined in the applicable maintenance publications for the given application.

The calibration steps required will vary depending on the:

- test instrument type
- test area material properties

#### Scanning the Test Area

The inspection is accomplished by scanning the test area with the instrument probe. To ensure proper crack detection, the probe must be moved with consistency over the surface. Keeping the probe in contact with, and as perpendicular to the surface as possible, while scanning prevents "probe wobble".

#### **Probe Wobble**

Probe wobble is the angular change that occurs when the probe is moved along a surface. When scanning with a probe, it is usually impossible to maintain the probe at the same angle as position is changed. In some instances holders may be fabricated to guide the probe and hold the angular relationship to the surface.

#### Lift-Off

Lift-off is the change in spacing between the probe and the inspection surface. Any change in contact with the inspection surface can cause variations in the meter readings. Lift-off is caused by the following:

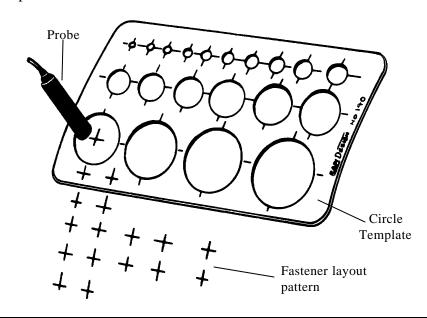
- probe wobble
- probe bounce
- inconsistent thickness of nonmetallic coatings (paint, primer, ect.).

#### **Probe Scanning**

Probe scanning procedures vary, depending upon the specific inspection steps required by the applicable maintenance publication.

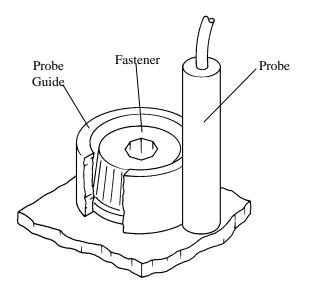
# Example 1, Scanning

The following example shows a scan around fasteners using a circle template.



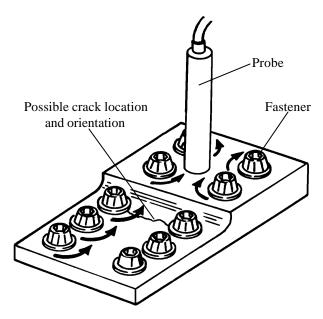
# Example 2, Scanning

The following example shows a scan using a fastener probe guide.



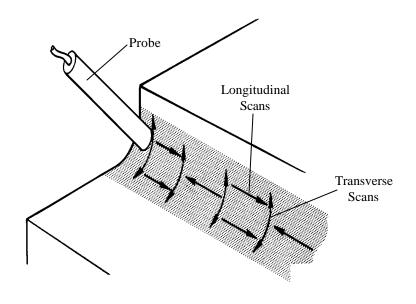
# Example 3, Scanning

The following example shows a scan between fasteners.



# Example 4, Scanning

The following example shows multidirectional scans of a curved surface.



Evaluating the test results consists of observing the meter readout as the surface is scanned and listening for instrument audible warnings (if available).

### Reading the Meter

Flaws in the test area will be indicated on the meter. Observing the speed and amount of movement of the meter needle deflection will indicate the type of flaw being scanned. Generally, sharp and minor deflections are the type most often observed.

- **Sharp** needle deflection: usually indicates a crack.
- **Minor** needle deflection: caused by changes in conductivity of the metal.

#### **Rejection Criteria**

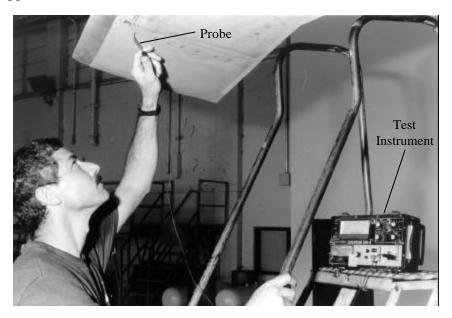
Allowed limits for rejection of a test component is always stated in the maintenance publication for the applicable eddy current inspection.

#### **CAUTION**

Inaccurate interpretation of eddy current test instrument meter readings may result in a flawed component remaining on the aircraft. Always present questionable test results to the attention of your supervisor.

### Application Illustration

The following illustration shows an eddy current inspection application:



### For More Information

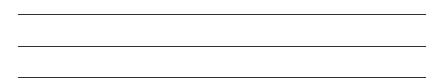
For more general information about Eddy Current nondestructive inspections, refer to the following references:

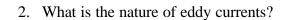
- Nondestructive Inspection Methods, AFTO 33B-1-1 (NAVAIR 01-1A-16), Chapter 3
- Aviation Structural Mechanic (H & S) 3 & 2, NAVEDTRA 12338, Chapter 15
- FAA Airframe & Powerplant Mechanics General Handbook, AC65-9A Chapter 10

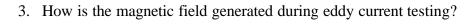
#### Questions

Answer the following questions on Eddy Current NDI:

1.	What is	the	definition	of eddy	currents?
1.	Willat 15	uic	acrimuon	or cady	currents.

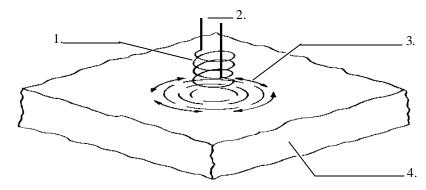






4. Label the components of the following eddy current generation diagram.



5. How are flaws detected when eddy currents are induced in metal?

# Questions (Continued)

6. Match the test instrument components in column A with their function in column B.

<u>Col</u>	umn A		<u>Column B</u>
1.	Oscillator	a.	The common form of eddy current signal display.
2.	Test Coil	b.	Provides an alternating current or specified frequency range to the test coil.
3.	Bridge Circuit	c.	Processes the signal from the bridge circuit.
4.	Signal Processing Circuits	d.	Coverts changes in eddy current magnitude and distribution into signals for subsequent processing and display.
5.	Readout	e.	Introduces a varying magnetic field into the part being inspected.
		f.	Suppresses frequency variations

7. Match the signal processing circuits in column A with their functions in column B.

Column A			Column B
1.	Amplifying	a.	Employed in all eddy current units to increase the strength of the signal for readout.
2.	Filtering	b.	Eliminate, separate, or analyze the response of various specimen properties and test conditions.
3.	Phase detection and phase discrimination	c.	Suppress unwanted signals from conditions for which inspection is not required.
		d.	Provides visual or audio test results.

Questions
(Continued)

8. Match the test instrument functions in column A with their descriptions in column B.

Column A			Column B		
	1.	Generating	a.	Processes the signal from the test coil to the required form and amplitude for display.	
	2.	Receiving	b.	Provides an alternating current to the test coil.	
	3.	Displaying	c.	Provides visual or audio test results.	
			d.	Processes the signal from the bridge circuit.	
9.	What	criteria determ	nines	the test instrument selection?	
10.		caution must y aments?	ou l	be aware of when using eddy current test	
11.		warning must ction?	you	follow when performing an eddy current	

Questions (Continued)	12. List below the safety hazards you must eliminate prior to starting an eddy current inspection.
	13. List below, in order, the three general performance steps of an eddy current inspection.
	1)
	2)
	3)

Questions (Continued)	14. List below the general cleaning guidelines for cleaning an inspection area.
	15. What is the proper scanning technique to use while scanning a test area?
	16. When the probe is moved along a surface, the angular change that occurs is called
	17. The change in spacing between the probe and the inspection surface is called

Questions (Continued)	18. List below the causes of lift-off.
	19. What type of meter deflection usually indicates a crack?
	20. What type of meter deflection is caused by changes in conductivity of the metal?
	21. What caution must you be aware of when interpreting meter readings?

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#### **Feedback**

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	Eddy currents are electrical currents induced in a conductor of electricity by reaction with a magnetic field.	4
2.	Eddy currents are circular in nature, and their paths are oriented perpendicular to the direction of the applied magnetic field.	4
3.	By an alternating current (AC) flowing through a coil of wire.	4
4.	<ol> <li>Coil</li> <li>AC</li> <li>Eddy Currents</li> <li>Test Part</li> </ol>	4
5.	When eddy currents are induced in a metal in the region of a crack or other flaw, the eddy current flow is distorted.	4
6.	1. b 2. e 3. d 4. c 5. a	6
7.	1. a 2. c 3. b	6
8.	1. b 2. a 3. c	7

# Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
9.	Aircraft type and inspection application.	7
10.	Improper use of the eddy current test instrument may produce inaccurate readings and result in a flawed component remaining on an aircraft.	7
11.	Electrical equipment shall not be operated in areas where combustible gases or vapors may be present, unless the equipment is explosion proof.	10
12.	Loose structures	10
	Support equipment	
	Electric cords	
	Toxic fluids	
	Fumes	
13.	1) Clean the test area.	10
	2) Inspect the test area.	
	3) Evaluate the test results.	

# Feedback (Continued)

The following is a continuation of the self-quiz feedback:

Question	Answer	Reference
14.	Remove all foreign matter and corrosion.	11
	When removing protective coatings, use a method that will not affect, cause damage, or mask any defects.	
	Do not use cleaning methods which mechanically abrade the surface of the area to be inspected since this may cause damage or mask the surface of the area.	
	Mask off areas that may be damaged by contact with removal solutions or mediums.	
15.	The probe must be moved with consistency over the surface; keeping the probe in contact with and as perpendicular to the surface as possible.	12
16.	Probe wobble	12
17.	Lift-off	12
18.	Probe wobble	12
	Probe bounce	
	Inconsistent thickness of nonmetallic coatings	
19.	Sharp	15
20.	Minor	15
21.	Inaccurate interpretation of eddy current test instrument meter readings may result in a flawed component remaining on the aircraft.	15

**Syllabus** 5.D.01 **Performance** INSPECT aircraft components using the Eddy Current nondestructive inspection method. Performance Given an aircraft component and necessary equipment, PERFORM an **Objective 1** Eddy Current nondestructive inspection IAW one or more of the following references: HH-65A • MPC Index • 1H-65A-36 • AFTO 33B-1-1 (NAVAIR 01-1A-16) **HH-60J** • MPC Index • A1-H60BB-SRM-200 • AFTO 33B-1-1 (NAVAIR 01-1A-16) HC-130H • MPC Index • 1C-130A-36 • AFTO 33B-1-1 (NAVAIR 01-1A-16) **HU-25A** 

• MPC Index

• Component Maintenance Manual, 32-40-05

• NAVAIR 04-10-1, Chapter 3

• AFTO 33B-1-1 (NAVAIR 01-1A-16)

## Performance Objective 2

Given the results of an Eddy Current nondestructive inspection, **EVALUATE** the results IAW one or more of the following references:

• MPC Index
• A1-H60BB-SRM-200
• AFTO 33B-1-1 (NAVAIR 01-1A-16)

HC-130H
• MPC Index
• 1C-130A-36
• AFTO 33B-1-1 (NAVAIR 01-1A-16)

- NAVAIR 04-10-1, Chapter 3
- AFTO 33B-1-1 (NAVAIR 01-1A-16)

#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the correct manuals used by the Coast Guard for air station shop safety programs.
- **STATE** the standard on instructing safety in the Coast Guard.
- **SELECT** the definition of acute exposure.
- **SELECT** the definition of chronic exposure.
- **DESCRIBE** the effects of dermatitis.
- **STATE** the responsibility of the technician in the Coast Guard respiratory protection program.
- **SELECT** the proper oxygen concentration required for the use of air-purifying respirators.
- **STATE** the approval ratings required for the respirators used in the Coast Guard.
- **STATE** the warning associated with the maintenance and repair of respirators.
- **STATE** who is responsible for the ultimate success of the hearing conservation program.
- **LIST** the symptoms of a person showing signs of over exposure to excessive noise.
- **STATE** the first aid response for someone who is showing signs of over-exposure to excessive noise.
- **STATE** the decibel level at which hearing protection is required.
- **DEFINE** Noise Reduction Rating (NRR).
- **STATE** the two conditions that must be present to result in an electrical shock.
- **STATE** the amount of current flow that is usually considered fatal.
- **STATE** the meaning of secondary electrical injury.

#### References

The information in this assignment can be found in the following references:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
- Technical Guide: Practices For Respiratory Protection, COMDTINST M6260.2 (series)
- Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
- First Aid and Health Lesson Plans, COMDTINST M6000.3 (series)
- Electronics Manual, COMDTINST M10550.25
- The Coast Guardsman's Manual (Blue Jacket's Manual), current edition

Overview 5.D.01c

#### Introduction

The purpose of this assignment is to introduce you to general safety and your responsibilities as a Aviation Maintenance Technician. This assignment will also give you a basic understanding of general safety guidelines, available sources of information, individual, supervisor, and command responsibilities.

### Your Responsibility

As a Second Class Petty Officer you will have a hand in the training of both the Airman and AMT3's, therefore it is your responsibility to familiarize yourself with the publications listed and learn from the information in this course to safely train your subordinates.

### In This Assignment

This assignment contains the following:

Subject Page
Types of Aviation Maintenance Publications5
Policy for Instructing Safety Lessons6
Types of Eye Protection7
Guidelines For Choosing Eye Protection8
Cleaning Eye Protection9
Personal Protection
Shop Safety Practices
Chemical Exposure
Types of Poisoning
Coast Guard Policy On Respiratory Protection
Atmospheric Supply Respirator21
Air-Purifying Respirators
Types of Test Ratings for Respirators24
How to Conduct a Respirator Negative Pressure Fit Check25
How to Conduct a Respirator Positive Pressure Fit Check 26

How 1	o Condi	uct a Pre	-Use Fi	t Check	for R	Respirators	27
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#### In This Assignment (Continued)

Subject I	Page
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Electrical Safety	37
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Types of Electrical Shock Injuries and Symptoms	39
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Electromagnetic Radiation (RF) Hazards	41
General Shop Safety Self-Quiz	43
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The following publications are used in the aviation maintenance safety programs and throughout the Coast Guard. Your ability to properly use and reference information within these manuals is integral to your job as an Aviation Maintenance Technician and will help as a guide for preparing your training lecture.

### COMDTINST M13020.1 (series)

The Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series) establishes shop safety standards and procedures for all Coast Guard aviation maintenance facilities. It contains information on basic shop safety practices and hand tool safety.

### COMDTINST M5100.47 (series)

The Safety and Environmental Health Manual, COMDTINST M5100.47 (series) is used throughout the Coast Guard and sets forth the policy and the elements of the Coast Guard safety program.

#### COMDTINST M16478.1 (series)

The Hazardous Waste Management Manual, COMDTINST M16478.1 (series) prescribes policies and procedures for compliance with federal hazardous waste regulations for all Coast Guard ships and shore activities.

#### COMDTINST M6260.2 (series)

The Technical Guide: Practices for Respiratory Protection, COMDTINST M6260.2 (series) provides the technical information necessary for the safe use of respiratory protection devices and requirements for administering the respiratory protection program.

#### Coast Guardsman's Manual (current edition)

Otherwise known as the Blue Jacket's manual, this publication gives you an excellent overview of basic safety and first aid used in the Coast Guard.

# Definition of Safety

Safety is the science and art devoted to the recognition, evaluation, and control of risk factors arising from man's environment which may cause injury, significant discomfort and inefficiency, property damage, or which could adversely affect the Coast Guard's mission capability.

#### Responsibility

You, as a member of the Coast Guard, have a personal responsibility to safeguard yourself and your fellow members as well as the government property entrusted to your care.

#### Instructing Standard

When instructing, only teach safety procedures and techniques that are 100% safe and IAW Coast Guard regulations.

### Common-Sense Questions

Common-sense is your best protection and safety device. Only you know your physical limits and demands of your body. Below is a list of questions you should ask yourself and teach others to ask prior to doing any job.

- Are there published guidelines for this task?
- Do I have the required safety equipment?
- Do I know what is expected from me?
- Can I accomplish this task without hurting myself?
- Can I accomplish this task without hurting others?
- Do I have the required skills needed to do the task?
- Do I have the required tools/materials to do the task?
- Do I have any unanswered questions?

#### NOTE

When in doubt, ask your supervisor.

Various types of eye protection, like tools, have a specific use for the job at hand. There is no one type of eye protection that can be used for all applications. Some applications might require you to use two types of eye protection at one time.

# Eye Protection and Their Descriptions

Listed below are some types of eye protection that protect your eyes, but in different ways.

Name of Protection	Descriptions
Safety Glasses	Similar in appearance to eye glasses, they have a mesh screen around the lenses to protect from large chips.
Safety Goggles	Protect by wrapping around your eyes much like a mask.
Safety Goggles (Liquid Use)	Protect by wrapping around your eyes much like a mask, but have small vents facing towards the back to prevent liquid from entering your goggles. This type is not to be used for grinding operations.
Face Shields	Used for covering your whole face, normally used for grinding operations and in conjunction with safety goggles.

## **Prescription Eye Glasses Warning**

Though most prescription glasses are impact resistant they are not of the same standard as safety glasses and will not offer the required protection.

#### WARNING

Prescription eye glasses shall not be used as safety glasses. If you wear prescription eye wear, always put safety goggles or a face shield over your glasses.

#### Methods For Choosing Eye Protection

Eye protection has only one function. That is to protect your eyes. When selecting eye protection ensure that the proper type of eye protection is selected for the task at hand. There are several factors involved in determining what type of eye protection devices should be used. They are as follows:

- Read the:
  - label of the product that you are using
  - Material Data Safety Sheet (MSDS)
  - maintenance manual or ACMS/MSR MPC
- If your work includes:
  - looking upwards at work surface
  - mixing, pouring, or moving liquids
  - grinding operations
  - compressed gas use

#### Guidelines For Pre-Use Checks

Eye protection should be inspected prior to use. The following checks will be done prior to donning the eye wear. Check for the following characteristics:

- Proper protection for the job at hand (grinding, liquids etc.)
- Lens cleanliness
- Lenses not scratched
- Strap or ear pieces intact
- Overall condition of the gear is in good repair (no loose hardware)

Eye protection, to be effective, must be usable. If eye protection is not clean and in usable condition no one will want to use it and this can cause accidents or injuries.

#### **Cleaning Policy**

Eye protection shall be stored and cleaned IAW the manufacturer's instructions and OSHA regulations.

### Cleaning Eye Protection

Eye wear should be clean before you put it on and cleaned after you are done using it. There are various types of cleaning solutions but use only the types that:

- Are compatible with the lens (no harsh solvents)
- Have an anti-bacterial agent
- Have degreasing characteristics

### Stowage of Eye Protection

Properly stowing eye protection is every bit as important as cleaning. Eye protection is not cheap and if not properly stowed will render the eye protection useless. After properly cleaning the eye protection, stow it by:

- Hanging it on hooks
- Placing in a well ventilated cabinet/rack
- Placing the eye protection in the case provided by the manufacture

#### **NOTE**

Never place the eye protection so that it is resting on the lenses. This will cause undesired scratching and impair the optical quality of the eye protection.

Your attitude towards safety is important. A good positive attitude and outlook will allow you to do the following:

- Achieve a maintenance goal safely
- Accomplish your job without injury
- Also by you using the proper safety equipment and projecting a good attitude, you enforce the safety standards to your subordinates.

#### **Policy on Jewelry**

The wearing of any type of jewelry, metal or non-metallic, shall not be worn while working in the shop or on aircraft.

#### NOTE

Medical Alert identification bracelets/necklaces are exempt from this rule.

#### Hazards of Jewelry

Jewelry can become caught on the side of the aircraft, snagged on machinery, or come in contact with live electrical circuits causing you to lose a finger, hand or become electrocuted.

## Examples of Jewelry

Listed below are some examples of jewelry:

- Bracelets
- Earrings
- Necklaces/dog tags
- Rings
- Watches

# Policy For Wearing Head Protection

Hard hats or head protection should be worn during any overhead work (any work over eye level) while on the hanger decks, shops, flight line, during crane and forklift operations or any work under an aircraft where there is a chance of hitting your head.

# Protective Clothing

Clothing is issued as protective gear for a variety of reasons. It can be issued for to:

- Extreme temperatures (either cold or hot)
- Welding
- Grinding
- Painting
- Fire fighting operations

# Care of Protective Clothing

Protective clothing is only as good as the condition it is in. Always clean and store the gear IAW the applicable publications.

Housekeeping is essential to shop safety. By keeping your shop and work area clean and clear of debris, you can dramatically cut down on the chance of injury.

### Housekeeping Guidelines

Good housekeeping starts with a plan. Below is a list of general housekeeping guidelines that you should follow prior to starting a task. Always ensure that the:

- Work area is clean
- Work area is sufficient to accomplish the task
- Proper fire safety equipment is available
- Proper waste/spill containment is available
- Work area ha sufficient lighting

#### **Machine Safety**

In almost all maintenance shops within the Coast Guard there is some sort of machinery. Machine safety should be practiced by everyone who walks into a shop. Just because there is no loud noise associated with the machine, do not assume that it is off. There have been untold numbers of MISHAP reports from units stating that a person has been injured because of the "I thought it was secured" syndrome. Even though a machine has been secured, most machines require a long coast-down time to come to a complete stop.

## Electrical Hand Tool Safety

Ensure that all power tools are properly grounded and check that none of the following exist:

- Frayed wire
- Bent prongs
- Split insulation
- Previous signs of arcing damage
- Flammable material or vapors are present

#### **Hand Tool Safety**

The use of hand tools causes more accidents annually than power driven tools. The main reason for this is the person using the tool. Often, the hand tool is being used for a purpose other than what it was designed for.

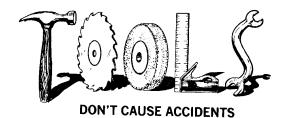
### Non-Example of Hand Tool Safety

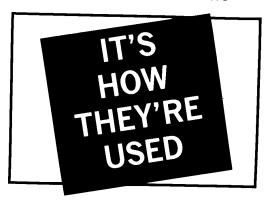
Some of the more obvious examples are the screwdriver being used as the pry bar. On top of the fact that most manufacturers print the caution on the handle informing the user not to do this, it still gets done. Result, a broken screwdriver and a technician with a hole in the hand or a chip of metal in the eye. Not to mention the paperwork the supervisor has to submit to the safety officer.

#### **Don't Forget**

Use the proper tool for the proper job and the proper tool, properly. Below is a list of some basic hand tool safety practices. For a full indepth discussion see the Aeronautical Engineering Maintenance Management Manual, M13020.1 (series).

- Do not throw tools from one person to the other
- Do not drop them down from one person to the other
- Do not carry them in your pockets
- Do not use defective tools





Due to the nature of the work of a maintenance technician, you are exposed to a bewildering array of chemicals. Chemicals are used every day for cleaning parts, aircraft, and floors. This section will introduce you to some of the more common problems associated with the effects of chemical exposure.

# **Definition of Acute Exposure**

Acute exposure is the result of exposure to excessive concentrations of a chemical, fume, or mist within a short time period.

# Example of an Acute Exposure

A technician was working in the fuel cell of a HC-130H when suddenly the technician started feeling dizzy, nauseous, and faint. This was presumably caused by the high concentrations of fuel vapors in the surrounding air and a possible leak in the technicians mask. Once removed from the area and breathing fresh air the technician was feeling fine.

### Definition of Chronic Exposure

Chronic exposure is the result of being repeatedly exposed to a chemical, mist, or fume for prolonged periods of time.

# Example of Chronic Exposure

A technician has worked the night shift for over eight months. With the fast-paced maintenance tempo, the technician decided putting on the proper hand protection seemed to be a waste of time while working with chemicals such as jet fuel and de-greasers, now the technician is constantly bothered with dried out itchy skin, the results of dermatitis.

# **Definition of Skin Absorption**

Your body can absorb chemicals through the skin. Chemicals that are absorbed through the skin can damage or burn your skin, damage your liver, kidneys, blood cells or nervous system. Knowing the chemical you are using, its effects and how to protect yourself is important.

# Example of Skin Absorption

An example of skin absorption is the medical skin patches that are used for cigarette smoking cessation programs. This patch has a medication which permeates the skin and is absorbed into the blood stream.

### Definition of Dermatitis

Dermatitis is a condition in where the skin is red, swollen, and often cracked. This is caused by the skin being stripped from its natural body oils. Dermatitis can be an annoying and painful skin problem. Dermatitis is avoidable if you use the proper precautions.

# Example of the Effects of Dermatitis

An example of dermatitis is the effect upon your hands after washing an aircraft. The cleaner that you use has chemicals that are designed to remove grease, be it grease from the aircraft or the natural oils of your hands, it makes no difference to the cleaner. Result: your hands feel dry and chapped due to the loss of natural oils in your hands.

### Definition of Protective Gloves

Since the chances of you getting dermatitis is increased as an AMT, wear protective gloves whenever required. Putting on just any glove will not guarantee your safety. The proper glove for the type of exposure you will encounter must be used. Certain chemicals will deteriorate certain gloves. For the proper protection requirements read the MSDS.

# Example of Correct Protective Gloves

You were assigned to do a composite repair on the airframe of a HH-65A. The maintenance manual tells you use hand protection when handling the resin and the catalyst. While reading the MSDS, latex surgical gloves are the type of hand protection recommended.

### Non-Example of the Correct Protective Gloves

You are assigned to take fuel samples on an aircraft. You get a pair of surgical gloves from your shop instead of those heavy rubber fuel resistant gloves next to the fuel sampling gear. While you are taking the fuel samples, fuel drips on the latex gloves and they begin to swell then fall apart in a matter of minutes, leaving you with no protection.

# **Testing Rubber Gloves**

Prior to putting on any rubber, latex, or plastic protective gloves, you should ensure that they are free from holes, tears, or cuts.

#### Rationale

The reasoning is simple, if there is a hole in the glove the liquid can enter, and the purpose of the glove has been defeated.

### Procedure for Testing Rubber Gloves

To check your glove, follow the steps below.

Step	Action
1.	Hold glove at each side of the edge of the gauntlet.
	Tun Sun Sun Sun Sun Sun Sun Sun Sun Sun S
2.	Revolve it about the edge of the gauntlet, thus rolling it towards the palm and fingers.
	Way to
3.	Hold the rolled-up gauntlet tightly in one hand.
4.	Squeeze the palm of the glove with the other hand as to put the confined air under pressure (gently, as not to pop the glove).
5.	If any puncture exists, you will detect it by the air escaping or the hole will be visible.
6.	If there is a hole, don't use the glove, and get another pair.

Poisoning can happen to you in many ways in the work area, but some of the most frequent causes are from ingesting (eating, swallowing) and inhalation (breathing) of the poison.

#### Ingestion

One of the most overlooked and yet common forms of poisoning is ingestion poisoning. The chemicals that you are using can be splashed into your mouth while washing airplanes, cleaning components, having dirty hands, or by the most frequent method, eating around a work area. Ingesting caustic or poisonous chemicals can burn or damage your mouth, esophagus, lungs, liver, or stomach.

### Guidelines to Avoid Ingestion Poisoning

By taking a few common sense precautions you will be able to avoid ingestion poisoning. Such as:

- Do not eat around a work area
- Ensure that your hands and arms are cleaned with soap and water
- Clean you face from oils, chemicals, dust and particles
- Also ensure that you remove your coveralls or any other protective clothing that you are wearing before entering your eating area

#### Inhalation

Every time you breathe, you inhale some type of chemical, and in a shop situation this can be dangerous. Solvents, paints, chromates, dust, and fumes can cause a variety of health problems. Your best protection from this is using the proper respiratory protection. Look in the MSDS for the required type of protection.

The use of respirators in the Coast Guard is mandatory for any work that might affect the respiratory system. Respirators are used in operations ranging from sand blasting, cleaning, to painting. Each type of respirator has a specific filtering function. Filters are not universal in their filtering capabilities. Each type of filter is designed for certain types of chemicals and environmental conditions.

# Guidelines For Selecting Filters

For selection of the proper filter read the MSDS for the chemical and/or the technical order/ACMS MPC for the job at hand. When in doubt, ask your supervisor or the Respiratory Program Coordinator at your unit for guidance.

### Respiratory Program Coordinator (RPC)

The Respiratory Program Coordinator (RPC) is responsible for the following actions:

- The correct respirators are used IAW NIOSH/MSHA standards.
- Self contained and supplied air systems deliver air which meets breathing air standards.
- Periodically observes and evaluates the actual use of respirators by unit personnel.

### 5.D.01c Coast Guard Policy On Respiratory Protection (Continued)

### Responsibility of The Supervisor

It is the supervisor's responsibility to assure the proper use of respirators during operations or activities and that the respirators are:

- Available
- Cleaned
- Stowed properly after use

## Responsibilities of The Technician

It is the responsibility of the technician to use the provided protection IAW the instructions and training received and to do the following:

- Inspect the respirator before and after each use.
- Report to the supervisor situations which may require respirator use and those in which respirators are not being used as required.
- Clean and maintain respirators as directed
- Stow properly after use

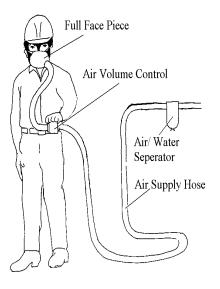
There are various types of respirators used in aviation today. Choosing the proper respirator for the task at hand is extremely important.

### Categories of Atmospheric Supply Respirators

Atmospheric supply respirators have their own air source or supply of air into the respirator face piece. These types of respirators are used in spaces that have little or no clean, breathable air in the compartment (like fuel cells and paint booths). There are two categories:

- Self-contained breathing apparatus (SCBAs) which supply air from a source (typically a cylinder) carried by the user.
- Supplied-air respirators (SARs) which supply air from a source (usually an air compressor) located some distance away and connected to the user by an air supply hose.

Illustration of a Supplied Air-Respirator Below is an illustration of a typical supplied-air respirator.



# Parts Function Table

Below is a parts function table for the atmospheric supply respirator.

Part	Function
Full Face Piece	Covers the whole face of the wearer and offers limited eye protection
Air Volume Control	Regulates air-flow to the mask
Air Supply Hose	Provides clean filtered air to the user from the supply source
Air/Water Separator	Separates the water from the air to provide the user with dry air

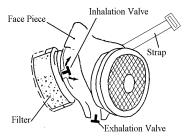
Air-purifying respirators do not have a separate air source. The respirators draw ambient air across a filter or purifying cartridge before the air enters the face piece.

#### WARNING

Air-purification filters will be used only where the oxygen level concentration is 19.5% or higher.

# Diagram of an Air-Purifying Respirator

Below is a view of a typical air-purifying respirator used within the Coast Guard today.



# Parts Function Table

Below is a parts function table for the above air-purifying respirator.

Part	Function
Filter	Filters out contaminates
Face piece	Provides sealing surface between the face and the filter
Strap	Holds the face piece snugly in position
Exhalation Valve	Exhaled air escapes without letting contaminated air in
Inhalation Valve	Located behind the filter, this one way check valve allows filtered fresh air in and closes while the user exhales

### **Types of Test Ratings For Respirators**

#### Introduction

Respirators do not work properly unless they fit the wearer. The quality of the respirator fit is determined by the seal where the respirator meets the wearer's face.

# Approved Types of Respirators

Approval ratings required for all respirators used in the Coast Guard are provided by the following organizations:

- Mine Safety and Health Administration (MSHA)
- National Institute for Occupational Safety and Health (NIOSH)

# Definition of Fit Testing

The fit test is performed by using a small smoke irritant such as isoamyl acetate, or saccharin solution and gently waving it around the mask. The user should not be able smell the offending chemical if the respirator is properly fitted.

# Policy For Fit Test

All personnel who use air-purifying respirators shall undergo a respirator fit test.

### How to Conduct A Respirator Negative Pressure Fit Check 5.D.01c

### Negative Pressure Check

The negative pressure check is used to see if the wearer has a properly fitted respirator. This shall be done every time the respirator is placed on the face prior to being exposed to the hazard.

### Negative Pressure Check Procedures

To properly accomplish a negative pressure check use the following procedures:

Step	Action
1.	Properly place the respirator on your face
2.	Tighten the face piece straps snugly
3.	Cover the filtering cartridge inlet with the palm of your hands (air-purifying) or pinch the hose (air-supplied)
4.	Gently inhale and hold your breath for about 10 seconds. The mask should squeeze against your face and hold a vacuum (if not start over at step 1)

### 5.D.01c How to Conduct A Respirator Positive Pressure Fit Check

### **Positive Pressure** Check

This check is used on respirators equipped with tight fitting face pieces which contain both inhalation and exhaust valves such as the self-contained breathing apparatus.

### Positive Pressure Check Procedures

To properly accomplish a positive pressure check use the following procedures:

Step	Action
1.	Secure the source of air
2.	Properly don the face piece
3.	Tighten the face piece straps snugly
4.	Cover up the exhaust valve with the palm of your hand or pinch the tube closed
5.	Exhale gently for at least 10 seconds. The mask should bulge out slightly with no escape of air (if not start over at step 1.

### **Purpose**

The purpose of the daily fit check or pre-use check is to ensure that the respirator is in good working order prior to doing any work.

# Pre-use Checks Procedure

These checks shall be performed before putting on the respirator each time that it is worn. Examine the face piece for:

Step	Action
1.	Excessive dirt (clean if required)
2.	Cracks, tears, holes or physical distortion
3.	Inflexibility of rubber face piece
4.	Cracked or torn check valves
5.	Straps in good repair
6.	Filter cartridge holder is not damaged, gaskets in place
7.	Choose correct filter for the task at hand (see MSDS)
8.	Filter is installed correctly
9.	Pressure test the face piece (negative or positive testing)

Respirator care is an essential part of this program. Without the proper care and cleaning of respirators, they will be rendered useless.

# Maintenance and Repair

Maintenance and repair of respirators must be done by thoroughly trained personnel.

#### WARNING

Do not interchange replacement parts between different brands or manufacturers. Such substitutions of parts or modifications will invalidate the MSHA/NIOSH approval of the respirator.

### Reason for Cleaning

Use of the respirator results in the exterior surface becoming dirty and/or contaminated. The interior surface is exposed to sweat and other body secretions which can, over a period of time, cause dermatitis. In addition, the use of the same respirator by different people may lead to the transmission of skin conditions between wearers and/or dermatitis.

#### Cleaning Guidelines

Follow the manufactures recommendations for disassembly and cleaning. If they are not available use the cleaning guidelines published in the Technical Guide: Practices For Respiratory Protection, COMDTINST M6260.2 (series).

# Storage Policy for Respirators

After the respirators are cleaned they must be stored properly. Store respirators:

- In a clean, dry location
- Away from direct sunlight
- Separated from chemical contaminates
- In clean plastic bags until re-issue
- In a single layer with the face piece and the exhalation valve in an undistorted position to prevent rubber or plastic from distorting

The Coast Guard's living and working environment contains many high intensity noise sources. Exposure of personnel to such noise, damages hearing and creates major health and fiscal impacts on Coast Guard resources, resulting in reduced mission capability.

### Definition of Hearing Loss

The ear responds to excessively loud noise over time, with the high pitch of hearing affected first. Therefore, early hearing loss is not noticeable and may go undetected by the individual for many years.

### Consequences of Loud Noise

If the noise level to the ear is not decreased, a person will eventually lose the ability to hear speech. This damage is permanent.

# Personal Responsibility

Ensuring that the hearing conservation program is successful is shared by the individual and the various levels in the Coast Guard organization. Ultimately the success of the hearing conservation program is your responsibility. You are always responsible for the following:

- Always practice good hearing conservation both at work and at home.
- Notify your supervisor of any unhealthy or unsafe working conditions or noise hazards.

## Definition of Noise

Noise is sound without value. It is the phenomenon of sound waves moving through air in much the same way ripples travel on an undisturbed pond.

# Definition of Decibel

Intensity of sound is commonly known as loudness and is measured in units called decibels dB(A). A zero on the decibel scale represents the lowest limit of human audible perception; the level of normal conversation is approximately  $60 \ dB(A)$ .

Noise is a part of everyday life and comes from a myriad of sources. The most thought of noise sources are often associated with that of an industrial source.

# Examples of Common Noise Sources

An example of common noise sources are hanger decks, flight lines, or in an aircraft. In reality you have the same risk, if not more, in a home environment. Noise from you lawn mower, chain saw, weed eater, and yes, even your stereo CD player with head phones.

# Physical Effects of Over Exposure to Noise

Noise can cause a lot of physical problems with you and your health. The severity of the problems depends on the level and the duration of exposure. Without proper hearing protection, the following symptoms can be caused by noise.

- Light headedness
- Dizziness
- Headaches
- Fatigue
- Dilation of blood vessels
- Rise in blood pressure
- Change in heart rate
- Nausea
- Rise in the blood cholesterol level

# First Aid for Over Exposure to Noise

If you notice anyone showing signs of over exposure to noise immediately remove them from the noise and get medical help ASAP.

## Long term Effects of Noise

Long term exposure can cause permanent and often non-reparable damage to your ear. This can not only affect your health, but your career.

### Hearing Conservation Program

This program is used to continually monitor a member who shows signs of hearing loss. When placed on this program, and there is no substantial improvement in your hearing within a prescribed time you can be grounded indefinitely. For further information and details see your medical department. Do not take chances. Wear the prescribed hearing protection.

Hearing protection devices come in a wide variety of shapes and designs but they have the same goal, to lower the input of noise to your ear.

### Types of Hearing Protection

Each type of hearing protection is rated a different Noise Reduction Rating (NRR), so it might be necessary to wear two sets of different types of protection. Ear protection comes in the following forms:

- Foam ear plugs
- Rubber (double, triple) flanged plugs (must be fitted by medical department)
- Formed plastic ear plugs (see the medical department)
- Head sets (commonly called Mickey Mouse ears)

## Ear Protection Charts

Ear protection is required whenever you know you will encounter noises greater than (>) 84 dB(A). The higher and longer the duration that you encounter, the more protection you will need. Follow the below chart for your hearing protection needs.

dB(A)	No Protection	<b>Protection Time</b>
>84	0 Seconds	Unlimited
>100	0 Seconds	Unlimited
>104	0 Seconds	Double hearing protection required after >104
>110	0 Seconds	Unlimited
>120	0 Seconds	4 Hours MAX
>130	0 Seconds	1 Hour MAX
?140	0 Seconds	5 Minutes MAX

# Correct Ear Plug Placement

The proper insertion and placement of ear plugs is important for them to offer optimal protection. Read the manufacturers instructions prior to using the ear plugs.



# Double Hearing Protection

It is always a sure bet to err on the side of safety and wear double hearing protection. The wearing of ear plugs and head sets will offer the best first line of protection. Do not take a chance with your hearing.

The purpose of hearing protection is to lower the input of noise into your ear. To accomplish this, the protection device is made of material which absorbs sound waves. The various materials used absorb sound waves at different rates.

### Definition of Noise Reduction Rating (NRR)

The noise reduction rating (NRR) is what determines the effectiveness of the hearing protection. The NRR is shown on the package that the hearing protection comes in. This number will help you to determine if the hearing protection that you have chosen is adequate or if you need to augment the protection. The higher the NRR the better the hearing protection offered.

#### **NRR Example**

The noise reduction rating (NRR) of hearing protection is simply figured out by finding out the decibel rating (or reading) and subtracting the NRR of the hearing protection that you have chosen. For instance, the decibel rating for a paint both was calculated at 95dB(A) by the an industrial hygienist. The ear plugs that your shop normally uses have a NRR of 30 dB(A).

95 dB(A) Paint booth noise rating
- 30 dB(A) NRR Ear plugs
65 dB(A) Hearing exposure level to you

This is well below the ?84dB(A) rating, which means you have good hearing protection for the task at hand.

#### **Purpose**

First Aid consists of emergency treatment of an injured or wounded person. The purposes of first aid are to:

- Save the victim's life,
- Prevent further injury or unfavorable progression, and
- Preserve the vitality and resistance to infection.

### Basic First Aid Procedures

The Coast Guard has trained you in basic first aid IAW the Syllabus of First Aid and Lesson Plan, COMDTINST M6000.3 (series) and you as a member of the Coast Guard and as a shop supervisor should know these procedures. There are four basic steps in first aid that you should remember. If you find a victim in need of first aid perform the following steps:

Step	Action			
1.	Call or send for help			
2.	Remove the cause or the victim from the cause			
3.	Perform the ABC'S:			
	Airway: ensure that the airway is clear			
	Breathing: verify whether the victim is breathing			
	Circulation: check for pulse and discoloration perform CPR if necessary			
	Shock: treat for shock if necessary			
3.	Seek medical treatment immediately, and/or report the injury to the unit safety officer			

### First Aid Treatment Rationale

*Never hesitate* to get medical care as soon as possible or call for assistance. You are not a doctor. No one has ever gotten in trouble for playing it safe, let the doctors make the judgment call.

The eye can be injured in many ways. Eye injuries range from impact to intrusion of a chemical or an object. With any eye injury seek medical help as soon as possible.

#### Intrusion

This is the most common type of an eye injury in an industrial area. The eye is injured from a particle or an object that punctures the eye or creates a deep scratch.

### WARNING

Never attempt to remove an object embedded in to the eyeball or has penetrated the eyeball. Seek medical help immediately.

### Splash

This eye injury is caused by a chemical being splashed into the eye. This often occurs while washing aircraft or while using solvents in a parts cleaning tank. Read the MSDS or the label on the container for further instructions on how to flush the eye. When taking someone to medical, if at all possible, take the container with you.

#### WARNING

Flush the eye out immediately for at least 15 minutes with fresh clean water away from the nose to prevent flushing the chemicals into the unaffected eye. Seek medical help immediately.

As an AMT you will have the chance to work on electrical equipment, therefore it is essential that you have an understanding of basic electrical safety. All electrical or electronic equipment should be considered dangerous with the potential to kill. It is impossible to cover every safety situation that you may encounter on the job.

### Personal Responsibilities

It is your responsibility to familiarize yourself with the electrical safety guidelines and practices located in the Electronics Manual, COMDTINST M10550.25 (series).

## Intentional Electrical Shock

Never intentionally give yourself an electrical shock from a battery, capacitor, or a megger (a low voltage output power supply).

### Definition of Electrical Shock

An electrical shock is the result of a person coming into contact with an energized electrical wire or circuit and resulting in a flow of electrical current through the body. The severity of the shock is based on many factors which add to or subtract from its intensity.

# Example of Electrical Shock

The following is an example of a victim who received an electrical shock. A technician working on an aircraft's 24 VDC electrical system (who did not disconnect the aircraft's battery) soon found out that by accidentally bridging the gap of a starter cable and grounding it to the metal airframe with a screwdriver, makes for a painful reminder.

### Conditions For an Electrical Shock to Occur

There are two conditions that must be present in order for current to flow through an individual's body resulting in an electrical shock. They are as follows:

- First, some part of the body, must form part of a closed circuit.
- Second, there must be a difference in potential to cause current to flow through the circuit.

Current flow depends on the electrical resistance of the circuit path through the victim's body. Human skin resistance can range from a few hundred ohms when wet, to well over 500,000 ohms when dry.

In order for your body to register an electrical shock, there must be some current flow.

### The Effects of Current Flow Table

The table below shows the general effects of current flow through the human body.

Current in milliamperes	Effects on the body
0	None
3	Mild tingling
10	Painful (gets your attention)
25	Very painful (you can't let go)
60	Severe (breathing difficulty)
140	Usually fatal (heart twitches)
200	Burning odor (heart clamps)

Electrical shock is an ever present yet avoidable aspect of working on aircraft. Unfortunately, the occasional accident happens, and you need to be prepared.

### Signs and Symptoms of a Serious Electrical Shock

The victim of a serious electrical shock may have any or all of the following signs or symptoms:

- Burns where the current flow entered and/or exited the body
- Nerve damage (paralysis)
- Muscle tenderness and or twitching
- Breathing difficulty (the tongue may swell and obstruct the airway)
- Irregular heartbeat or cardiac arrest
- Blood pressure may be elevated or lowered
- Restlessness/irritability or loss of consciousness
- Visual difficulties
- Seizures
- Secondary injuries (cuts, bruises, broken bones, etc.)

### Secondary Electrical Injuries

Often, secondary injuries are sustained from an electrical shock as a result of surprise, and are sometimes in themselves fatal. Such as:

- Burns
- Falling off work stands
- Thrown into another live circuit

### **Purpose**

Personnel suffering from electrical shock must be removed from the hazard as soon as possible. Depending on the amperage or the duration of the electrical shock, the chances of the victim's survival is in your hands. Acting quickly and ensuring your safety is essential to you and the victim.

### Rescuing Electrical Shock Victims Table

The following table lists the steps for rescuing electrical shock victims:

### WARNING

High amperage can cause the victim to hold on to the source of power. Do not touch the victim without securing the source of power or without using *DRY* rescue equipment

Step	Action
1.	Call, or send for help
2.	Remove the cause or the victim from the cause by securing the power by using a suitable dry non-conductive object (wooden cane or dry blanket)
3.	Pull the victim from the source of power
4.	Check for the ABC'S
	• Airway
	• <b>B</b> reathing
	Circulation
	Shock (treat if necessary)
5	Seek medical treatment immediately, and/or report the injury to the unit Safety Officer

Electromagnetic radiation (RF) from radar, and communication transmitters are hazardous and cause undesirable effects under certain conditions.

# Categories of Radiation Hazards

Generally, these radiation hazards fall into one of the following categories:

- Induced voltage effects
- Personal biological injury

### Personal Biological Injury

When electromagnetic energy is absorbed by human tissues, heat is produced. The body cannot dissipate this heat as fast as it is produced, therefore the internal temperature of the body will increase causing damage to tissue and internal organs.

# Example of Biological Injury

Microwave ovens demonstrate perfectly how energy is absorbed by biological tissue. Though there is no heat transferred from the electronics source to the tissue, the tissue absorbs the energy and heats up internally. This is fine for ground round, but not so good for living human tissue.

#### **RF Sources**

RF sources come from various aircraft and hanger equipment. They are:

- High Frequency antennas (HF)
- Radar dishes
- Side Looking Airborne Radar (SLAR)

### 5.D.01c Electromagnetic Radiation (RF) Hazards (Continued)

# Signs of RF Exposure

While working on the hanger or out on the ramp you could be inadvertently exposed to RF radiation. Some of the most common signs of RF exposure are:

- Your eyes have the sensation of having sand in them
- Skin starts tingling (cooking)
- Skin starts feeling warm
- Electrical shock (if you touch the antenna)

#### **NOTE**

If you have been exposed to, or think you have been exposed to RF radiation, seek medical help at once.

### Body Organs Most Sensitive to RF Radiation

Exposure to RF radiation can have damaging, long lasting, and even permanent damage to your body. The most RF sensitive organs of the human body are the:

- Eyes
- Testicles

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Answer the following questions on General Shop Safety.

1.	State the manual used to establish safety standards and procedures for all Coast Guard aviation maintenance facilities.				
2.	State the standard for instructing, on the subject of safety within the Coast Guard.				
3.	Match the name in column A column B. Use each letter on		appropriate statement in		
	Column A		Column B		
	<ol> <li>Acute</li> <li>Chronic</li> </ol>	a.	Repeated exposure over a prolong period of time		
		b.	Exposure limit is not a factor		
		c.	Exposure over a short period		
			Continued next page		

Questions (continued)	4.	Describe the effects of dermatitis on your skin.
	5.	State the responsibility of the technician in the Coast Guard respiratory protection program.
	6.	When wearing an air-purification respirator you must ensure that they are being used in areas where the oxygen concentration is percent.
		A. 5 B. 9 C. 19.5 D. 29.92
	7.	All respirators used in the Coast Guard must meet the requirements of what organization(s).  a.)  b.)

Questions (continued)	8. State the warning associated with the maintenance and repair of respirators.	
	9. Who is ultimately responsible for the success of the hearing conservation program?	
	10. List the symptoms of a person who has been exposed to excessive noise?	
	a.)	
	b.)	_
	c.)	
	d.)	_
	e.)	_
	f.)	_
	g.)	
	h.)	
	i.)	
	11. If a person is showing signs of being over exposed to noise what should your first aid response be?	

### General Shop Safety Self-Quiz (Continued)

Questions (continued)	12. At what decibel level is hearing protection required?
	13. Define: Noise Reduction Rating (NRR).
	14. What two conditions must be present to result in electrical
	shock?  a)  b)
	c)
	15. What current flow is usually considered fatal?
	16. What is a secondary electrical injury?

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#### Feedback

Compare your answers to the feedback provided below. If you had trouble with the Self-Quiz, please review the appropriate section of this reading assignment.

Questions	Answers	Reference
1.	Coast Guard Aeronautical Engineering Maintenance Management Manual COMDTINST M13020.1 (series)	5
2.	When instructing, only teach safety procedures and techniques that are 100% safe and IAW Coast Guard regulations.	6
3.	1. c 2. a	14
4.	Your hands feel dry and chapped due to the loss of natural oils in your hands.	15
5.	It is the responsibility of the technician to use the provided protection IAW the instructions and training received.	20
6.	С	23
7.	<ul><li>a. Mine Safety and Health Administration (MSHA)</li><li>b. National Institute for Occupational Safety and Health</li></ul>	24

### 5.D.01c General Shop Safety Self-Quiz Feedback (Continued)

# Feedback (Continued)

This is a continuation of the feedback table on the proceeding page.

Question	Answer	Reference
8.	Do not interchange replacement parts between different brands or manufacturers. Such substitutions of parts or modifications will invalidate the MSHA/NIOSH approval of the respirator.	28
9.	Ultimately the success of the hearing conservation program is your responsibility.	29
10.	Light headedness	30
	• Dizziness	
	Headaches	
	Fatigue	
	Dilation of blood vessels	
	Rise in blood pressure	
	Change in heart rate	
	Nausea	
	Rise in blood cholesterol	
11.	Immediately remove them from the noise and get medical attention ASAP.	32
12.	>84 dB(A)	32
13.	Determines the effectiveness of hearing protection.	34

# Feedback (Continued)

This is a continuation of the feedback table on the proceeding page.

Question	Answer	References
14.	a. Some part of the body must form part of a closed circuit.	37
	b. There must be a difference in the potential to cause current to flow through the circuit.	
15	140 milliamperes	38
16.	Injuries that are sustained from electrical shock as a result of surprise, and are sometimes in themselves fatal.	39

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Syllabus 5.D.01c

#### **Performance**

INSTRUCT personnel in shop safety procedures.

### Performance Objective 1

Given the applicable publications, **PREPARE** a training session on shop safety IAW:

- Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
- Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
- Technical Guide: Practices For Respiratory Protection COMDTINST M6260.2 (series)
- Hazardous Waste Management Manual, COMDTINST M16478.1 (series)
- First Aid and Health Lesson Plans COMDTINST M6000.3 (series)

# Performance Objective 2

Given the applicable publications, **PRESENT** a training session on general shop safety IAW the Military Requirements For Becoming a Senior Petty Officer MRNSPO 0458 (series).

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Syllabus 5.D.02

#### **Performance**

PRESERVE AND DE-PRESERVE aircraft equipment.

### Performance Objective

Given various aircraft equipment and the necessary equipment to perform the task, **PRESERVE/DE-PRESERVE** the aircraft equipment IAW one or more of the following references:

HH-65A

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- 1A-H65A-2-1, Chapter 10
- 1H-65A-11-72-2B2, Chapter 71
- MPC Index, Chapter 72
- COMDTINST M13020.1 (series)

**HH-60J** 

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- A1-H60CA-GAI-000
- A1-T700A-MMI-200
- COMDTINST M13020.1 (series)

HC-130H

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- T.O. 2J-T56-56
- MPC Index, Chapters 61 and 85
- COMDTINST M13020.1 (series)

### Performance Objective (Continued)

#### **HU-25A**

- NAVAIR 15-01-500
- NAVAIR 00-80R-19
- 1U-25A-2, Chapter 10
- MPC Index, Chapters 12 and 71
- COMDTINST M13020.1 (series)

Performance	BUILD-UP an aircraft wheel and tire assembly.
Performance Objective 1	Given an aircraft wheel and tire assembly, and the necessary equipment, <b>DISASSEMBLE</b> the wheel and tire assembly IAW one or more of the following references:
	• MPC Index, Chapter 32
	• AFTO 4T-1-3
	• AFTO 4W-1-61
	• NAVAIR 04-10-1
	• NAVAIR 04-10-506
	HH-65A
	НН-60Ј
	НС-130Н
	HU-25A
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Syllabus

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5.D.03

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### Performance Objective 2

Given an aircraft wheel and tire assembly, and the necessary equipment, **INSPECT** the wheel and tire assembly IAW one or more of the following references:

- MPC Index, Chapter 32
- AFTO 4T-1-3
- AFTO 4W-1-61
- NAVAIR 04-10-1
- NAVAIR 04-10-506

HH-65A	
НН-60Ј	
НС-130Н	
HU-25A	

HC-130H

**HU-25A** 

# Performance Objective 3

Given an aircraft wheel and tire assembly, and the necessary equipment, **ASSEMBLE** the wheel and tire assembly IAW one or more of the following references:

MPC Index, Chapter 32
AFTO 4T-1-3
AFTO 4W-1-61
NAVAIR 04-10-1
NAVAIR 04-10-506
HH-65A

HH-60J

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#### **Objectives**

To successfully complete this assignment, you must study the text and master the following objectives:

- **STATE** the guidelines that should be followed when disassembling an engine.
- **DESCRIBE** the materials and methods that may be used to mark engine parts.
- **STATE** the publication that should be used when inspecting engine bearings.
- **STATE** the guidelines that should be followed when inspecting the following engine internal components/sections:
  - Bearings
  - Carbon Seals
  - Combustion Section
  - Turbine Section
- **DESCRIBE** the different types of damage that may be found in an engine.
- **STATE** the possible cause(s) of the different types of damage that may be found in an engine.
- **STATE** the PRIMARY purpose for cleaning gas turbine engine parts.
- **STATE** the advantages of rigid and fiber-optic borescopes.
- **STATE** the appropriate guidelines to follow when borescoping an engine.
- **STATE** the purpose of nondestructive inspections.
- **IDENTIFY** the characteristics of the different types of nondestructive inspections.

#### 5.D.04

### **Inspecting Engine Internal Components (Continued)**

#### References

The information contained in this assignment can be found in the following references:

- Aviation Machinist's Mate 3 & 2, NAVEDTRA 12300
- Aviation Structural Mechanic (H & S) 3 & 2, NAVEDTRA 12338, Chapter 15
- Cleaning of Gas Turbine Aircraft Engines and Parts, AFTO 2J-1-13,
- General Electric Aircraft Engines, NAVAIR 02-1-20
- General Instructions, Jet Engine Anti-Friction Bearings, AFTO 44B-1-15
- Maintenance of Aeronautical Anti-Friction Bearings, NAVAIR 01-1A-503,
- Nondestructive Inspection Methods, AFTO 33B-1-1 (NAVAIR 01-1A-16)

Overview 5.D.04

#### Introduction

This assignment introduces you to inspecting engine internal components, which operate at high speeds and/or high temperatures. Under these operating conditions, the internal components are susceptible to various types of damage. Therefore, most turboshaft, turboprop, and turbofan engines are inspected internally on a regular schedule. These scheduled inspections are usually accomplished by using a borescope or disassembling the engine.

# In This Assignment

This assignment contains the following:

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#### Introduction

Anytime an engine is disassembled, for any reason, it should be inspected for serviceability and repaired as required. For inspection procedures, repair procedures, and serviceability limits on your engine refer to the applicable maintenance manual or ACMS card.

#### **Guidelines**

When disassembling an engine, the following guidelines should be observed:

- Examine all parts and assemblies for cracks, scoring, and burning (some types of damage are more obvious before parts are cleaned).
- Place all parts on a parts rack to prevent damage.
- Provide proper covering and supports to protect shafts, gears, studs, or any projecting piece from being bent, scratched, or otherwise damaged.
- Use temporary covers to seal all openings in dismantled engines to prevent dirt and other foreign materials from entering the engine.
- Plug or cover the ends of all removed/disconnected tubing/lines.
- Mark parts as necessary for identification to aid in re-assembly, or to highlight damage.

#### Purpose

Parts may be temporarily marked during disassembly for identification, reference points to aid in re-assembly, or to highlight damage. These marks ensure parts are returned to their original assembly position and to locate defects.

### Maintaining Part Identification

If a part is going to be cleaned, inspected, and repaired, temporary markings will probably be removed by solvents during cleaning. If part identification needs to be maintained, attach tags or place parts in separate containers.

### Marking Guidelines

When marking parts, adhere to the following guidelines:

- Use only the engine manufacturer's approved marking materials and methods IAW the engine maintenance manual.
- Do not use any temporary marking method that leaves a heavy carbon deposit, or deposits of copper, zinc, lead, or similar residue, i.e. pencil/grease pencil.
- Do not use wire to attach tags to parts (use string).

#### **Marking Materials**

Only certain materials must be used for marking parts during disassembly or assembly. Use only DyKem, Marks-A-Lot, or other approved pure dye markers to mark engine hardware. You may use layout dye (lightly applied) to mark parts that are directly exposed to the engine gas path (turbine blades and disks, turbine vanes, and combustion chamber liners).

### Effects of Using Unauthorized Marking Materials

Using unauthorized marking materials can leave harmful deposits on engine parts. These deposits may cause carbonization or intergranular attack when the part gets hot. Parts marked with unauthorized materials should have all traces of markings removed before using them.

#### Introduction

Because of high rpm, main engine bearings are critical parts of an engine. With the engine disassembled, all bearings and housings can be inspected and replaced as necessary.

### Guidelines for Inspecting/ Handling Bearings

While inspecting/handling bearings follow these guidelines:

- Handle new and used bearings with care at all times (used bearings may be reused).
- Do not handle bearings with bare hands (the oils in your skin can promote corrosion).
- Use clean, non-absorbent gloves or special devices to handle bearings.
- Do not handle bearings with perspiration-soaked cotton gloves.
- Clean cotton gloves may be used to handle bearings as a last resort.

# Detecting Damage

The need for mechanical measurement of a bearing is seldom necessary because excessive bearing wear or damage can usually be detected by the following:

- Visual inspection
- Hand-feel test

# Inspecting for Damage

Using a magnifying glass as an aid (if necessary), visually inspect the bearing and all contact surfaces for the following types of damage:

- Missing components
- Cracked or bent retainers
- Broken or damaged races
- Dents
- Nicks
- Pits
- Scratches
- Scoring
- Galling
- Brinelling
- Corrosion
- Grooves on rolling elements
- Heat damage
- Excessive wear

### Inspection References

For detailed descriptions of the various types of damage refer to the General Instructions, Jet Engine Anti-Friction Bearings manual, AFTO 44B-1-15. Also refer to the maintenance manual for your engine to determine if the damage is within limits.

#### **Hand-Feel Test**

Excessive bearing wear can usually be detected by a roughness of metal on the active (contact) surfaces. To perform the hand-feel test, hold one race stationary while rotating the other. If appreciable damage has occurred on the active surfaces, the bearing will feel rough and be noisy. If it fails the hand-feel test, reject the bearing.

#### Introduction

Aircraft engine carbon seals are made of precision-machined carbongraphite which is very brittle. Special care shall be exercised at all times when handling or working on carbon seals. A substantial loss of sealing capacity may result from damage or distortion, or from foreign matter in the seal assembly.

### Guidelines for Inspecting/ Handling Carbon Seals

When inspecting/handling carbon seals, observe the following guidelines:

- Do not use marking compound or tape on seal parts at any time, since any resulting residue will affect operation of the seal.
- Do not place used carbon segments in styrofoam because the solvents used in cleaning will cause segments to stick to packing.
- Do not attempt to repair carbon surfaces of seal (except to restore flatness).
- Do not touch any part of sealing surfaces since finger prints can affect flatness of sealing surface.
- Do not allow lubricating oil to contaminate sealing surface of seal or its mating ring.
- Clean only with approved solvents.
- After cleaning, place carbon seals in plastic bags or a suitable protective wrapping paper.

## Inspecting for Damage

Inspect carbon seals for the following types of damage:

- Sealing surface wear
- Pits
- Scratches
- Nicks
- Chipping
- Cracks

### Damage Terminology

To describe the damage found during engine inspections you must know the proper terms to use. The following table is a partial list of terms, a description of what it looks like, and the probable cause.

Term	Appearance	Usual Causes
Bow	Bent blade	Foreign objects or excessive heat
Burning	Injury to surfaces evidenced by discoloration or, in severe cases, by flow of material.	Excessive heat
Burr	A ragged or turned-out edge	Grinding or cutting operation
Corrosion (pits)	Breakdown of the surface; pitted appearance	Corrosive agents; moisture, etc.
Cracks	A partial fracture (separation)	Excessive stress due to shock, overloading, or faulty processing; defective material; overheating
Deformation	Waviness along the leading edge	Excessive heat
Dent	Small, smoothly rounded hollow	Striking of a part with a dull object
Erosion	Material worn away	Normal wear and/or small particles passing through engine
Galling	Transferring of metal from one surface to another	Severe rubbing
Gouging	Displacement of material from a surface; a cutting or tearing effect	Presence of a comparatively large foreign body between moving parts
Growth	Elongation of blade	Continued and/or excessive heat and centrifugal force
Material Fallout	Missing material	Converging cracks, excessive heat, and Foreign Object Damage (FOD)

### Damage Terminology (Continued)

This is a continuation of the Damage Terminology table from the previous page.

Term	Appearance	Usual Causes
Pit	(See Corrosion)	
Score	Deep scratches	Presence of chips between surfaces
Scratch	Narrow, shallow marks	Sand or fine foreign particles; careless handling
Tip Rollover	End of rotor blades curled over	Excessive tip rub
Tip Rub	Scored casing in tip path plane	Shock or blade growth
Warpage	Unnatural contours	Excessive heat

#### Introduction

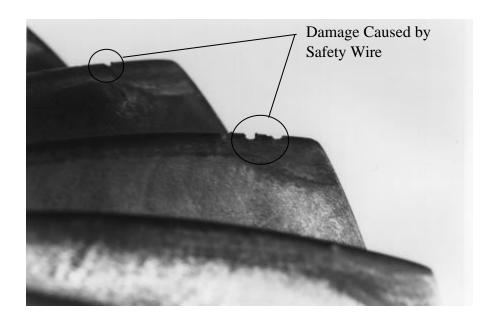
The compressor section can be inspected with a borescope or during engine tear down. It may be a scheduled inspection or due to a problem with engine performance.

# Foreign Object Damage (FOD)

Loose objects often enter an engine's compressor either accidentally or through carelessness. Thousands of dollars in damage can result from these objects passing through the engine.

### **Example of FOD**

The illustration below shows the damage caused by a piece of safety wire passing through a LTS-101-750B-2 compressor.

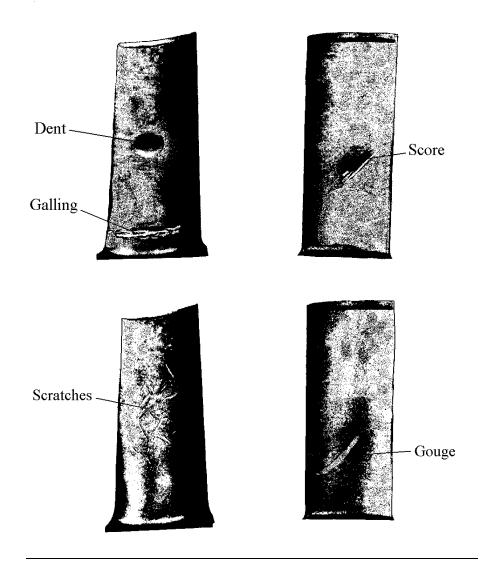


#### Inspection

When inspecting the compressor section, you should look for the types of damage shown in the Examples of Compressor Blade Damage below. You should also look for broken blades and evidence of FOD. Refer to the appropriate maintenance publication for your engine for the types of damage to look for and the limitations.

# Examples of Compressor Blade Damage

The following are examples of damage to look for on compressor blades.



#### Introduction

Depending on the engine, the combustion section can be removed, repaired, or replaced in part or entirely depending on the extent of damage encountered. Most repairs to this section are accomplished by welding or replacing components.

# Inspecting for Damage

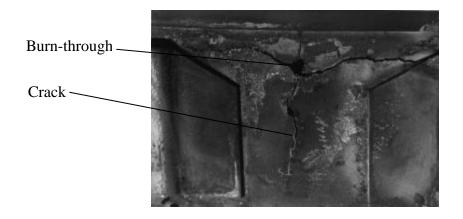
Inspect the combustion liner for the following types of damage:

- Cracks
- Overheating/hot spots (metal discoloration)
- Fretting (metal wear where the combustion liner contacts other metals, i.e. fuel nozzle port)
- Burn-through (hole in liner)
- Broken spot welds

This list is not all inclusive. For specific inspection criteria for your engine, refer to the applicable maintenance publications.

# Example of Combustion Section Damage

This illustration shows cracks and burn-through on an ATF3-6 combustion liner.



#### General Guidelines

When inspecting combustion sections use the following general guidelines:

- Use the dye penetrant NDI method to enhance the visual inspection.
- Cracks converging so that metal could break loose is cause for rejecting a liner.
- Combustion chamber components may be retained in service with some flaws.

For specific damage limitations on your engine refer to the applicable maintenance manual and replace or repair components as required.

#### Introduction

Damage in the turbine section is usually found during a scheduled borescope inspection. Turbine sections are exposed to extreme heat, therefore all the components should be thoroughly inspected. Once the damage has been determined to be out of limits, the engine is either replaced or disassembled for further inspection, repair, or replacement of defective components.

### Inspecting for Damage

Whether you are performing a borescope inspection or the engine has been disassembled, you should inspect for the following types of damage:

- Turbine rotor and blades:
  - Cracks
  - Sulfidation
  - Stress rupture cracks
  - Deformation (waviness) of the leading edge
  - Nicks and dents
  - Burning
  - Tip rub
  - Erosion
- Nozzle vanes:
  - Nicks
  - Burrs
  - Dents
  - Pits
  - Distortion
  - Cracks
  - Burned areas

### Interpreting Damage

Stress rupture cracks or deformation of the leading edge are often mistaken for foreign object damage (FOD). When these conditions are found, suspect an over temperature condition and investigate the possible cause.

Sulfidation 5.D.04

#### Introduction

Sulfidation is high-temperature corrosion that starts with excessive levels of sodium and sulfur in the air and fuel mixture entering the engine. This type of environment causes sulfidation to attack turbine blades and stator vanes, which disrupts airflow.

### Description of Sulfidation

Sulfidation first appears as a rough or crusty surface on the leading edge and concave surface of the airfoil. It progresses to scaling, splitting, delamination, and eventual metal loss.

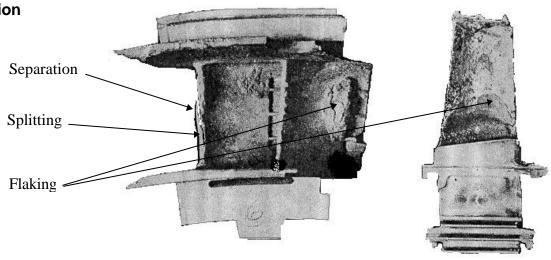
#### Acceptable/ Unacceptable Sulfidation

This form of corrosion is permissible in the rough or crusty stage. All blades should be inspected for sulfidation and the component should be replaced if in any area of the blade there is evidence of any of the following types of damage:

- Splitting
- Delamination
- Separation
- Flaking
- Loss of material

Example of Unacceptable Sulfidation

This illustration shows some examples of unacceptable sulfidation.

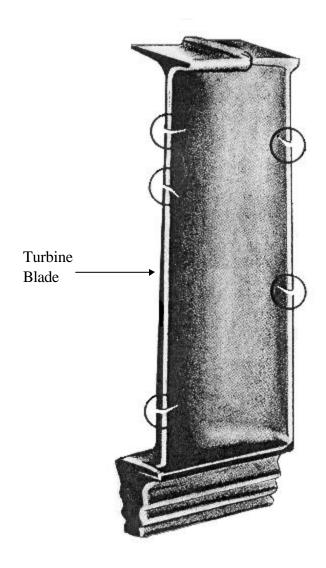


### **Description**

Stress rupture cracks usually appear as fine hairline cracks. These cracks are found on or across the leading or trailing edge at a right angle to the edge length of the blade. Visible cracks may range in length from 1/16 inch upward.

# Example of Stress Rupture Cracks

The circled areas in this illustration shows what stress rupture cracks look like.



### **Description**

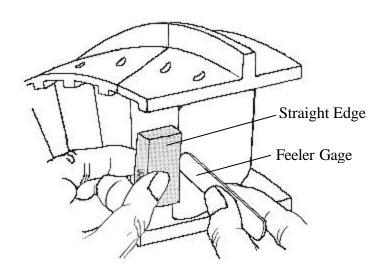
Stator vane bowing is a vane that is curved, and it is usually caused by high heat.

# **Checking Vane** for Bowing

Visually inspect stator vanes for signs of bowing. If bowing is suspected, use a straight edge and feeler gage to measure the amount of bowing. Compare your findings to the limitations listed in the maintenance manual for your engine and replace as required.

# Illustration of Checking Vane for Bowing

This illustration shows a technician checking a vane for bowing with a straight edge and feeler gage.



#### **Purpose**

The primary purpose for cleaning gas turbine engine parts is to remove the contaminants that might conceal minor cracks and defects which, if not detected, could eventually lead to failure. All parts must be sufficiently cleaned so a thorough inspection can be performed.

### Definition of Clean

Clean means that the part is free of rust, flaky scale, grease, paint, oily films, and dirt.

### Avoid Over Cleaning

Gas turbine engine components will be cleaned only as necessary to perform adequate inspection and repairs. In some cases, over cleaning can be more detrimental than beneficial to an engine. Bright surfaces are obtained only with vigorous methods which sacrifice some base metal. Repeated use of these methods, followed by oxidation and scale buildup during use, can be detrimental to the dimensional stability of the components. Therefore, over cleaning should be avoided.

### Cleaning Processes and Agents

There is no single cleaning agent or process that will clean all of the parts. Different cleaning agents are necessary for different metals. The selection of a cleaning agent will have to be made based on the metal to be cleaned and the cleaning method you will use. When selecting a cleaning agent, the following questions must be answered:

Will the cleaning agent...

- attack the metal chemically?
- leave a residue?
- cause the metal to corrode?

To answer these questions and for detailed descriptions of cleaning agents, cleaning processes and the metals they can be used on, refer to the Cleaning of Gas Turbine Aircraft Engines and Parts manual, AFTO 2J-1-13.

Water Washing 5.D.04

#### Definition

Water washing is the process of injecting an emulsion of water and cleaning liquids into the engine inlet while the engine is being motored.

## Purpose for Water Washing

Water washing is accomplished for the following reasons:

- Primarily as a desalination wash to remove salt deposits after an aircraft has been operated in salt-laden air.
- When engine performance has degraded significantly, water washing may remove enough dirt, sulfidation, and other deposits to recover the lost engine performance.
- Although water washing is not required before borescoping, it is
  often recommended because it helps clean the engine so you get
  the best possible evaluation. Dirt and carbon particles may
  obscure small cracks or pitting that could be missed in a dirty
  engine.

### General Procedures

Specific steps to follow in cleaning a particular engine are found in the maintenance instructions for that engine. However, the table below lists the basic steps for water washing any engine.

Step	Action
1	Block appropriate lines and ports.
2	Remove appropriate equipment from the inlet duct to prevent damage by cleaning material.
3	Motor the engine for a specified time period while the cleaning compound is fed into the inlet duct.
4	Motor the engine for a specified time period while clean water is fed into the inlet duct to rinse the engine.
5	Return the engine to its original configuration by restoring whatever was disconnected or removed in steps 1 and 2.
6	Dry the engine by running it for a specified time period.

#### **Purpose**

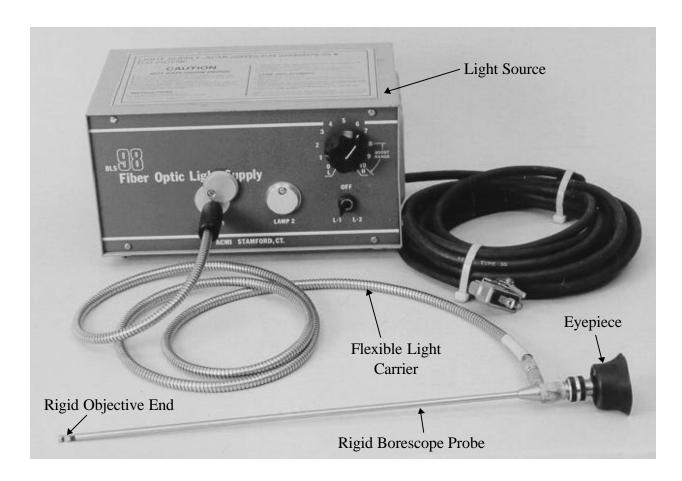
Borescopes provide illumination and a way to visually inspect internal areas of aircraft engines and engine parts. Using a borescope allows for internal inspections that require minimum disassembly, such as the removal of port covers, ignitors, or thermocouples.

# Description of a Rigid Borescope

The rigid borescope assembly has a straight, non-flexible shaft which only allows for inspection of internal engine conditions in areas that have direct access.

# Illustration of a Rigid Borescope

This illustration shows the components and accessories of a typical rigid borescope.



# Part/Function Table

The following table lists the parts and functions of the rigid borescope.

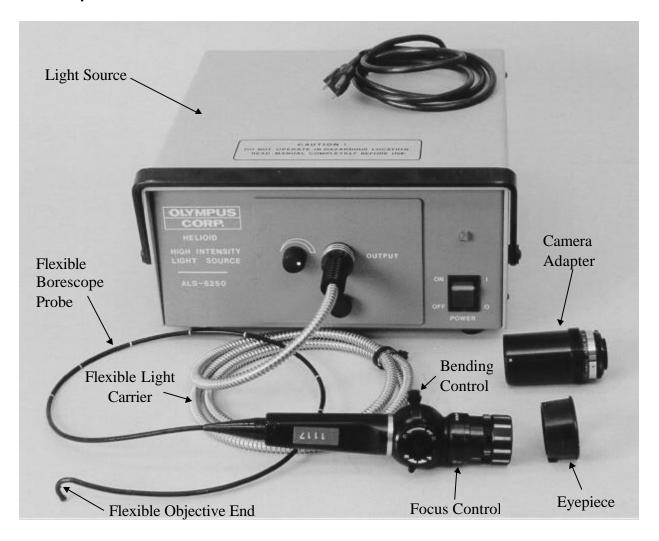
Part	Function
Light Source	Provides high-intensity light for viewing
Flexible Light Carrier	Transmits light from source to borescope
Rigid Borescope Probe	Transmits light from borescope to objective end and provides access to internal engine components which can be directly accessed
Rigid Objective End	Illuminates and views internal areas of the engine
Eyepiece	Keeps surrounding light from interfering with the view

### Fiber-Optic Borescope

This type of borescope has a flexible probe and is also called a fiberscope. The flexible probe can be snaked around, behind, and into areas impossible to reach with a rigid scope.

# Illustration of Fiber-Optic Borescope

This illustration shows the components of a fiber-optic borescope.



# Part/Function Table

The following table lists the parts and functions of the fiber-optic borescope.

Part	Function	
Light Source	Provides high-intensity light for viewing	
Flexible Light Carrier	Transmits light from source to borescope	
Flexible Borescope Probe	Transmits light from borescope to objective end and provides access to internal engine components	
Flexible Objective End	Illuminates and views internal areas of engine	
Bending Control	Used to position (bend) objective end	
Focus Control	Used to focus the view	
Eyepiece	Keeps the surrounding light from interfering with the view	
Camera Adapter	Allows for the attachment of a camera to record engine conditions	

# Advantages of Fiber-Optic Borescope

The fiber-optic borescope has the following advantages over the rigid borescope:

- Inspect areas without opening the engine
- Can be worked back through the compressor from the front of the engine.
- Can be inserted through a fuel nozzle opening and worked back to the turbine area.
- Can be worked up close to the surface being inspected.

The ability to access possible damage at very close range is a distinct advantage over the rigid type borescope. A fiber-optic borescope and an inspector experienced in its use could make the difference between the man-hours spent rejecting a perfectly good engine or obtaining more flight hours from that same engine after suspected damage was found not to exist.

Before using a borescope, familiarize yourself with its features and learn how to use them. Borescopes are easily damaged, and they have different characteristics.

# Example of Different Characteristics

Optical characteristics of a small borescope magnify and distort all areas other than the turbine blade leading edge. This is often misinterpreted by the technician to be extensive damage.

# Locating Inspection Ports

For the location of inspection ports on your engine and what can be inspected from that port, refer to the applicable maintenance publication.

# Guidelines for Using Borescopes

Follow these guidelines when using a borescope on an aircraft engine:

- Establish internal reference points.
  - Pictorial and cut-away diagrams help establish reference points.
  - Some borescopes have an index mark on the eyepiece to show the direction in which the objective end is facing. When the probe is in the inspection port, it is easy to lose your sense of direction.
- Scan the inspection area thoroughly and in an orderly manner.
  - Damage to the compressor and turbine blades can be difficult to detect because of small close parts
  - Rotate the engine slowly
  - Ensure the borescope optics are not deteriorated
  - Maintenance publications will list the types of damage to look for in a particular area.
- Inspect all areas for the following types of damage:
  - Cracks Bends
  - ScratchesGroovesCarbon BuildupCarbon Streaks
    - Grooves Carbon Street
  - Rub Marks Corrosion
    - Nicks Dents
    - Galling Erosion
  - Discoloration Tears

# Guidelines for Using Borescopes (Continued)

### Measure cracks

- Mark or bend an 18-inch length of lockwire and insert the wire through an adjacent inspection port
- This wire can be used as a gage to measure vane cracks while viewing through the borescope

### **CAUTION**

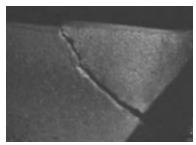
Ensure that the borescope probe is not damaged when rotating the engine. On turbofan engines, you should not borescope if there is a possibility that wind can rotate the fan rotor.

- Inspect rotating parts
  - Rotate the engine (by hand only) to inspect the rotating components
  - Refer to the applicable maintenance publication for the proper method to rotate the engine
- Record findings
  - Record all damage information including stage, area, magnitude, direction, and adjacent material conditions
  - Some borescopes are capable of being connected to a video camera to record engine conditions
- Determine Serviceability
  - Compare your findings with serviceability limits in the applicable maintenance publication for your particular engine
  - Report your conclusions and recommendations to your supervisor
- Follow Procedures
  - Carefully read and follow the procedures in your engine maintenance manuals for borescoping
  - Different procedures are required for different types of engines to prevent damage or to properly inspect

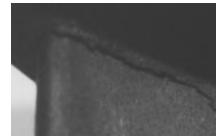
Viewing internal engine components through a borescope can be deceiving. It takes time and practice to learn to use a borescope properly and to interpret what you are viewing. Positioning the viewing probe is the most important factor in performing a proper borescope.

# **Examples of Borescope Views**

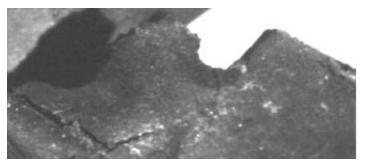
The illustrations below show typical borescope views of damage in various engines.



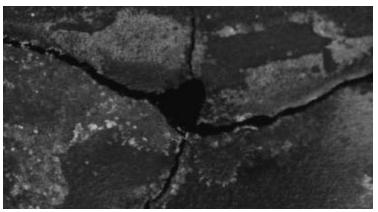
Cracked LTS-101 Stator Vane



Cracked T56-A-15 Stator Vane



Cracked and Burned LTS-101 Gas Producer Wheel Rotor Blade



Cracked and Burned ATF3-6 Combustion Liner

Nondestructive inspection (NDI) methods are utilized to inspect engine components when there is suspected damage or if the procedure is required. The material in this section is basic, but it will enable you to identify the different NDI methods by identifying the distinct characteristics of them.

### **Definition of NDI**

Nondestructive inspections employ various methods to check the soundness of a material or part without impairing or destroying the serviceability of the part.

### Qualified NDI Personnel

Knowing how to identify the different types of NDI's does not qualify you to perform these inspections. Some NDI's are fairly simple and can be learned on-the-job by working with others while using job aids, such as ACMS MPC's. Other detailed and in-depth inspections may have a certification requirement.

### **NOTE**

Ask your supervisor for guidance if you are directed to perform a task you are not thoroughly familiar with.

# Attending Advanced NDI Training

Advanced training is available for nondestructive inspections. See the Leading Chief Petty Officer at your unit for more information if you are interested in attending this training.

Visual inspection is the oldest NDI method. Though not generally referred to as a NDI method, it is performed without damaging the part to be inspected.

# Application of Visual Inspections

All you need to perform a visual inspection is eyesight and sufficient light. This is obvious, but how you view what you are inspecting can be the difference between finding, or not finding, a discrepancy.

# Viewing Perspectives

When performing a visual inspection, there are different viewing perspectives used. Combining these views can alter your perception of parts in relationship to each other. Listed below are the common views used to perform visual inspections:

- front
- side (left and right)
- top
- bottom

# Tunnel Vision and Big Picture

*Tunnel vision* and *big picture* are unofficial terms not found in publications you use on the job, as related to aircraft. These terms are mentioned here because you will hear them used, and they are significant to your viewing perspective when performing visual inspections.

### **NOTE**

The term tunnel vision is commonly spoken in a negative manner, but in reality, it is inherently used during visual inspections. It is when tunnel vision and big-picture viewing perspectives are used together that a more thorough visual inspection can be performed.

## Description of Tunnel Vision and Big Picture

Listed below are descriptions of tunnel vision and big picture:

- **Tunnel vision** is viewing (focusing) on one part at a time. It provides for a concentrated viewing of a part. This type of viewing does not take into account the relationship of the surrounding area or other parts, to the part being viewed.
- **Big picture** viewing takes into account the relationship of a part being viewed with the surrounding area and other parts.

## Example of Combining Tunnel Vision and Big Picture

Sometimes there may be only a singular part to be viewed, for example, a fuel control assembly in an engine shop. When this same fuel control assembly is mounted on an engine that is installed on an aircraft, you would visually inspect the fuel control *and* view it in relation to the surrounding area and other parts.

# Equipment Used to Enhance Visual Inspections

Defects which would escape the naked eye can be magnified so they will be visible. The following types of equipment employ magnification to enhance visual inspections:

- Magnifying glasses
- Borescopes

Common Discrepancy Table When performing visual inspections, you can make use of your other senses to confirm something your eyes suspect. The following table lists common discrepancies you may identify by the human range of senses. It is not all inclusive and does not list the sense of taste.

Sight	Touch	Hearing	Smell
Leaks	Leaks	Leaks	Leaks
Obstructions	Obstructions	Obstructions	Burning
Burning	Heat/cold	Loose hardware	Lack of cleanliness
Corrosion	Corrosion	Delamination	
Loose hardware	Loose hardware	Chafing	
Discoloration	Delamination		
Misalignment	Lack of cleanliness		
Dents, punctures, cracks, cuts, etc	Dents, punctures, cracks, cuts, etc.		
Delamination			
Improper pressure/fluid levels			
Lack of cleanliness			
Chafing			

Example of Integrating Visual Inspections with Other Inspections

Use of the visual inspection method is integral to all other types of inspections.

<u>Example</u>: the final evaluation of results for a Dye Penetrant NDI are inspected visually.

Dye Penetrant NDI is a simple, inexpensive, and reliable method used for detecting defects which are open to the surface of the part to be inspected. This method can be used on metals and other nonporous materials that are not damaged by penetrant materials.

### **Component Table**

The components used to perform a dye penetrant inspection is listed in the table below.

Component	Purpose
Cleaner	Used to clean the surface to be inspected
Penetrant	Permeates defects in the metal
Developer	Aids in drawing any trapped penetrant from defects and improves the visibility of defects
Ultra-violet Light	Reflects off the penetrant to highlight defects

# Inspection Kit Components

The following illustration shows the components of a Dye Penentrant NDI kit.



Ultra-violet Light

Developer, Penetrant, & Cleaner Aerosol

# Dye Penetrant Inspection Steps

The following table lists the steps of a Dye-Penetrant NDI.

### NOTE

The apparent simplicity of the penetrant inspection is deceptive. Very slight variations in performing the inspection process can invalidate the inspection by failing to indicate serious flaws.

Step	Action	Illustration
1	Clean the test area with the required cleaner.	
2	<b>Apply the penetrant</b> solution to the test area. The penetrant is allowed to remain on the part for a period of time (dwell time) to permit it to enter and fill any opening or defect.	
3	Wipe off excess penetrant. The excess penetrant is then removed.	The same of the sa
4	<b>Apply the developer</b> to the test area. The developer aids in drawing any trapped penetrant from defects and improves the visibility of indications by providing contrast.	
5	Evaluate the test results using a blacklight.	

Magnetic particle inspection is a NDI method used for detecting discontinuities on or near the surface in materials that can be magnetized.

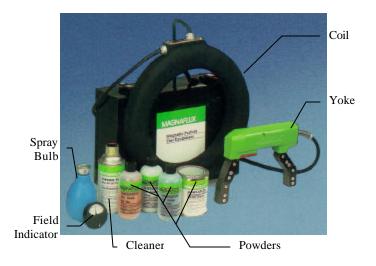
# **Component Table**

The components used to perform a magnetic particle inspection is listed in the table below.

Component	Purpose
Cleaner	Cleaning the test area.
Magnetic particles (powder)	Applied to magnetized part to detect defects.
Spray bulb	Applies the magnetic powder.
Yoke	Continuously applies a magnetic field.
Coil	Continuously applies a magnetic field.
Field Indicator	Measures residual magnetism in parts.

# Inspection Kit Components

The following illustration shows the components of a Magnetic Particle NDI kit.



# **Magnetic Particle Inspection Steps**

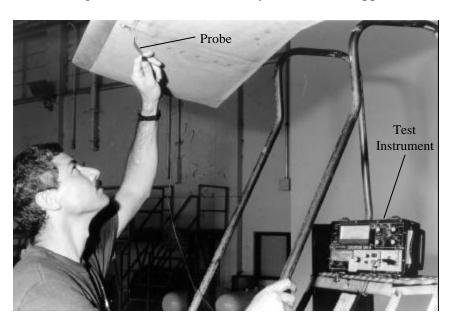
The following table lists the steps of a Magnetic Particle NDI.

Step	Action	Illustration
1	Clean the test area.	2: 25:
2	Apply the test equipment (yoke) to the test area for continuous magnetization of the area.	000 my
3	Apply magnetic particles to the test area. The particles will adhere to the area containing a defect.	TONE TO THE TOTAL THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOT
4	Evaluate the test results.	

Eddy current inspection is a NDI method used in which eddy current flow is induced in the test area. Eddy currents are electrical and circular in nature. Their paths are oriented perpendicular to the direction of an applied magnetic field.

# Inspection Illustration

The following illustration shows an Eddy Current NDI application.



# Parts and Functions

This table lists the parts and functions of the eddy current NDI test instrument.

Part	Function	
Probe	Introduces a varying magnetic field into a part	
	Determines the effects of test variables on this magnetic field	
	Sends signals back to the test instrument.	
Test Instrument	Generates an alternating current to the test coil	
	Receives feedback signals from the probe	
	Displays signals through visual or audible instrumentation	

# Eddy Current Inspection Steps

The following table lists the steps of an Eddy Current NDI.

Step	Action
1	Clean the test area with appropriate cleaning materials.
2	Calibrate the test instrument to the surface material as per instructions (normally ACMS MPC's).
3	Inspect the test area as per instructions.
4	Evaluate the test results.

Ultrasonic inspection is an NDI method that uses sound waves. The term "ultrasonic" means vibrations (sound waves) whose frequencies are greater than those that affect the human ear.

# Types of Ultrasonic Inspections

Ultrasonic NDI can be separated into two basic types:

- Contact
- Immersion

The contact method is the only method currently used in Coast Guard aviation.

# Inspection Illustration

The following illustration shows an Ultrasonic NDI application.



# Inspection Description

Ultrasonic test units (instruments) may vary in design, but the basic principles of operation for the contact method of inspection are the same.

# Phase/ Description Table

The following table lists the phases and descriptions of the Ultrasonic NDI process.

Phase	Description
1	Sound waves (ultrasonic vibrations) are generated by applying high-frequency electrical pulses to a transducer element.
2	The transducer element transforms the electrical energy into sound waves. It is an integral part of the search unit assembly (the search unit is the device placed upon the surface of the test part).
3	Sound waves are transmitted between the search unit and the test part through a coupling medium, such as oil. This coupling medium also removes any air between the transducer and the test part.
4	The sound waves are transmitted into and through the part. When the sound waves strike the far surface of the part or the boundary of a defect, they reflect back through the test part, the coupling medium, and then enter the transducer, where they are converted back into electrical energy.
5	The electrical energy is converted, displayed, and then interpreted on a cathode ray tube (CRT) screen or a metered scale. The results are then evaluated.

5.D.04 Blank Page

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	swer the following questions on Inspecting Engine Internal emponents:
1.	Anytime an engine is disassembled it should be
2.	What should be done to prevent the entrance of dirt and other foreign materials into a dismantled engine?
3.	When disassembling an engine, why should you examine all parts and assemblies prior to cleaning?
4.	When marking parts that are directly exposed to the engine gas path, you may use
5.	Why should you NOT handle bearings with your bare hands?
6.	What publication should be referred to for detailed descriptions of different types of damage that may be encountered when inspecting engine bearings?
7.	The transferring of metal from one surface to another is known as
8.	When inspecting for cracks, what NDI method would be used to enhance a visual inspection of combustion liners?

# 5.D.04 Inspecting Engine Internal Components Self-Quiz (Continued)

Questions (Continued)	9. Stress rupture cracks on turbine blades are often mistaken for what type of damage?
	10. Sulfidation is permissible in the or stage.
	11. The primary purpose of cleaning gas turbine engine parts is to
	12. A rigid borescope allows for inspection of internal engine conditions in areas that have
	13. To inspect engine internal rotating parts, you should rotate the engine by only.
	14. Nondestructive inspections use various methods to check the soundness of a material or part without
	Continued next page

# Inspecting Engine Internal Components Self-Quiz (Continued) 5.D.04

# Questions (Continued)

15. Match the characteristics of nondestructive inspections listed in column B with the NDI methods listed in column A. Use each letter only once.

Column A	Column B
,1. Visual	a. Uses magnifying glasses
,2. Dye Penetrant	b. Oldest method
,3. Magnetic Particle	c. Uses aerosol cans
4. Eddy Current	d. Uses sound waves
, 5. Ultrasonic	e. Detects on or near surface discontinuities in magnetized materials
	f. Particles adhere to defects
	g. Uses penetrant and developer solutions
	h. A search unit is placed on the surface of test part
	i. Calibrate test unit to surface

# 5.D.04 Inspecting Engine Internal Components Self-Quiz Feedback

# Self-Quiz Feedback

Compare your answers to the feedback provided below. If you had trouble with this self-quiz, please review the appropriate section of this assignment.

Question	Answer	Reference
1.	inspected for serviceability	5
2.	Use temporary covers to seal all openings	5
3.	Some types of damage are more obvious before parts are cleaned	5
4.	layout dye	6
5.	Oils in your skin can promote corrosion	7
6.	T.O. 44B-1-15	8
7.	galling	10
8.	Dye Penetrant	15
9.	Foreign Object Damage (FOD)	16
10.	rough or crusty	17
11.	remove contaminants that might conceal defects which could lead to failure	20
12.	direct access	22
13.	hand	28
14.	impairing or destroying the serviceability of the part	30

Self-Quiz Feedback (Continued) This is a continuation of the feedback table on the preceding page.

Question	Answer	Reference
15.	1. a, b 2. c, g 3. e, f 4. i 5. d, h	31, 32 34, 35 36, 37 39 40, 41

5.D.04 Blank Page

**Syllabus** 5.D.04 **Performance** INSPECT aircraft engine internal components for service and repair limits. **Performance** Given the name of an aircraft internal engine component and necessary **Objective 1** equipment, LOCATE the component using one or more of the following references: HH-65A • 1H-65A-11-72-2B2 • 1H-65A-11-72-11B2 • 1H-65A-11-72-4B2 **HH-60J** • A1-H60CA-220-300 • A1-T700A-MMI-200 • A1-T700A-IPB-400 HC-130H • 2J-T56-44 • 2J-T56-53 • 2J-T56-56 • MPC Index, Chapters 72, 73, 74 **HU-25A** • 2J-ATF3-2-1

• 2J-ATF3-2-2

• 2J-ATF3-2-3

• MPC Index, Chapters 72, 73, 74

Continued next page

• 2J-ATF3-4

# Performance Objective 2

Given the name of an aircraft internal engine component and necessary equipment, **IDENTIFY** the publication containing the procedures for inspecting the component using one or more of the following references:

HH-65A	
• 1H-65A-01	
• MPC Index, Chapter 72	
НН-60Ј	
• A1-H60CA-AML-000	
• MPC Index, Chapter 72	
НС-130Н	
• CGTO 1C-130H-01	
• 1C-130H-2-00JG-00-1	
• MPC Index, Chapters 72, 73, 74	
HU-25A	
• CGTO 00-25-01	
• MPC Index, Chapters 72, 73, 74	

# Performance Objective 3

Given the name of an aircraft internal engine component and necessary equipment, **INSPECT** the component using the procedures in one or more of the following references:

# **HH-65A** • AFTO 33B-1-1 • 1H-65A-11-72-2B2 **HH-60J** • MPC Index, Chapter 72 • AFTO 33B-1-1 • A1-H60CA-220-300 • A1-T700A-MMI-200 • A1-T700A-MMI-210 HC-130H • AFTO 33B-1-1 • 2J-T56-53 • 2J-T56-56 • MPC Index, Chapters 72, 73, 74 **HU-25A** • AFTO 33B-1-1 • 2J-ATF3-2-1 • 2J-ATF3-2-2 • 2J-ATF3-2-3

• MPC Index, Chapters 72, 73, 74

# Performance Objective 4

Given the name of an aircraft internal engine component and necessary equipment, **IDENTIFY** the inspection standards and wear/repair limits IAW one or more of the following references:

# HH-65A MPC Index, Chapter 72 1H-65A-11-72-2B2 1H-65A-11-72-11B2 HH-60J MPC Index, Chapter 72 A1-H60CA-220-300 A1-T700A-MMI-200 A1-T700A-MMI-210 HC-130H 2J-T56-53 2J-T56-56 MPC Index, Chapters 72, 73, 74 HU-25A 2J-ATF3-2-1

• 2J-ATF3-2-2

• 2J-ATF3-2-3

• MPC Index, Chapters 72, 73, 74

4. In what manual are the directives for the involvement in the JOAP located?
A. M3710 1 (series)
B. M13020.1 (series)
C. NAVAIR 1-1-2
D. NAVAIR 17-15-50 (series)
5. When taking a JOAP sample, use only
eations audit rags that are clean and
working
A. made of cotton
B. made of cloth
C. lint free
D. waterproof
6. When taking a JOAP sample, you can use the sampling tubes/syringes for
ed to request sampling
1 0
1? A. twice, if used with the same color
of oil
B. only once

B. CG-22

C. CG-4377

D. AF Form 847

C. twice, if the tube/syringe has been

flushed with degreaser
D. as many times as needed to cut

down on cost

- 7. Specific inspection requirements for each aircraft type can be found in which of the following Commandant Instructions?
  - A. M3710.1 (series)
  - B. M3710.2 (series)
  - C. M13020.1 (series)
  - D. M130550.1 (series)
- 8. Which of the following inspections is categorized as a routine inspection?
  - A. Hourly/Weekly
  - B. TCTO
  - C. Bird Strike
  - D. Hard Landing
- 9. Special inspections are maintenance checks that
  - A. are accomplished on a regular or scheduled basis and appear on the Maintenance Due List
  - B. are conditional upon operational environment, specific incidents, or other circumstances requiring inspections
  - C. provide servicing and verification of satisfactory functioning of critical systems at frequent intervals
  - D. determine if the aircraft is suitable for continued flight at the end of each flight and are tracked through ACMS

- 10. If a maintenance procedure requires a follow-up special inspection, it is scheduled on which form?
  - A. CG-4377, Part II
  - B. CG-4377B
  - C. CG-4377A
  - D. CG-5181
- 11. Applicability of a TCTO is determined by \_\_\_\_\_.
  - A. Commandant (G-SEA)
  - B. Engineering officer at each unit
  - C. Aircraft type Prime Unit
  - D. Aircraft Standardization Team
- 12. To track compliance, a TCTO will appear on which ACMS report?
  - A. How Gozit Report
  - B. Maintenance Due List (MDL)
  - C. Configuration Report
  - D. Maintenance Requirements List (MRL)
- 13. Which feature of an Air Force Interim TCTO serves as direction for compliance?
  - A. Solid black border
  - B. Black and white diagonal border
  - C. Double heading
  - D. Heading in red ink

- 14. Select the group below that has the correct sequence of general troubleshooting steps.
  - A. 1. Perform an operational check
    - 2. Isolate and Locate the malfunction
    - 3. Conduct a visual inspection
    - 4. Classify the malfunction
    - 5. Correct the malfunction
    - 6. Conduct a final operational check
  - B. 1. Classify the malfunction
    - 2. Conduct a visual inspection
    - 3. Isolate and Locate the malfunction
    - 4. Correct the malfunction
    - 5. Perform an operational check
    - 6. Conduct a final operational check
  - C. 1. Conduct a visual inspection
    - 2. Perform an operational check
    - 3. Classify the malfunction
    - 4. Isolate and Locate the malfunction
    - 5. Correct the malfunction
    - 6. Conduct a final operational check
  - D. 1. Isolate and Locate the malfunction
    - 2. Conduct a visual inspection
    - 3. Perform an operational check
    - 4. Classify the malfunction
    - 5. Correct the malfunction
    - 6. Conduct a final operational check

15. Using the troubleshooting scenario below, select from the list of general troubleshooting steps the next step that should be performed.

You are the technician working on a hydraulic pressure fluctuation discrepancy; you notice that the fluid in the hydraulic reservoir is below the "minimum" level. You service the hydraulic reservoir to the correct level. There are no apparent leaks in the system and there are no other visible conditions that could affect the system.

In reference to the general troubleshooting guidelines, what should be your next step?

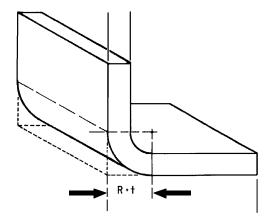
- A. Perform an operational check
- B. Isolate and locate the malfunction
- C. Classify the malfunction
- D. Conduct a visual inspection
- 16. Select the general troubleshooting step that involves this general troubleshooting guideline characteristic: "verifying the suspect component".
  - A. Isolate and locate the malfunction
  - B. Classify the malfunction
  - C. Perform an operational check
  - D. Conduct a visual check

- 17. What is the form called that must be installed on the aircraft cockpit controls before rigging/range checks are performed?
  - A. Flight Safety Maintenance Document
  - B. Unsatisfactory Tag
  - C. Serviceable Tag
  - D. Maintenance Flight Safety Warning Tag
- 18. When an aircraft has been rigged and adjusted, where do you annotate the new rigging calculations?
  - A. Aircraft Inventory Record
  - B. Airframe and Engine Operating Information
  - C. ACMS Configuration Report
  - D. ACMS Significant Component History Report
- 19. What is the definition of a range check?
  - A. A check to ensure the relative alignment of the flight controls to the aircraft structural stops meet specified clearance checks
  - B. A verification that the flight controls are properly rigged
  - C. Adjusting surface travel, system, cable tension, linkages, and adjustable tops specifications
  - D. A check performed to check the relative alignment and adjustment of an aircraft's main structural components

- 20. What is the definition of a rigging check?
  - A. To check that the flight controls are properly rigged and respond properly to the cockpit controls input
  - B. To check the relative alignment and adjustment of an aircraft's main structural components, flight controls surfaces and flight control system.
  - C. To check the relative alignment of the flight controls to the aircraft structural stops
  - D. To check the relative alignment of the weight on wheels switch with the flight controls
- 21. During the actual servicing of an aircraft's oxygen system, you should follow the guidelines set forth in the \_\_\_\_\_.
  - A. ACMS MPC's
  - B. AFTO 1-25-172
  - C. NAVAIR 01-25-172
  - D. NATOPS 01-130-1
- 22. After you are finished using a refrigerant manifold and gage set, you should
  - A. flush the hoses and manifold with fresh water.
  - B. purge the hoses and manifold with compressed air.
  - C. cap the lines after removing them from the refrigerant.
  - D. purge the lines with refrigerant to clean out any dirt or moisture.

23. Which compressed gas can cause immediate frostbite if exposed to living tissue?	27. Airframe mechanical seal application procedures require the seal.
<ul><li>A. Nitrogen</li><li>B. Oxygen</li><li>C. Air</li><li>D. R-134a</li></ul>	<ul><li>A. normalizing</li><li>B. applying</li><li>C. heating</li><li>D. installing</li></ul>
24. Which of the following are methods used in airframe sealing?	<ul><li>28. Which of the following is a basic type of airframe sealant?</li><li>A. MIL-S-8802</li></ul>
<ul><li>A. Pressure and brush</li><li>B. Preformed and sealant</li><li>C. Mechanical seal and sealant</li><li>D. Bulk and preformed</li></ul>	B. MIL-S-0002 C. Organic D. Pliable
25. A type of rubber used to manufacture airframe mechanical seals is rubber.	29. Distortion and secondary damage are types of damage that would be found during a inspection.
<ul><li>A. bulk</li><li>B. pliable</li><li>C. preformed</li><li>D. silicon</li></ul>	<ul><li>A. visual</li><li>B. hardness test</li><li>C. nondestructive test</li><li>D. magnetic particle test</li></ul>
26. In which of the following locations are airframe mechanical seals used?  A. panels	30. Which structural damage classification is given to damage which cannot be repaired by any practical means?
<ul><li>B. windows</li><li>C. doors</li><li>D. all the above</li></ul>	<ul><li>A. Negligible</li><li>B. Repairable by patching</li><li>C. Repairable by insertion</li><li>D. Necessitating replacement</li></ul>

- 31. Which type of structural damage repair restores a limited load-carrying ability to the damaged structure?
  - A. Permanent
  - B. Semi-permanent
  - C. Temporary
  - D. One-time flight
- 32. Maintaining the required external contour at the station where they are located is a characteristic of a \_\_\_\_\_.
  - A. longeron
  - B. rib
  - C. bulkhead
  - D. stringer
- 33. In the illustration below, Which bend layout term are the arrows identifying?
  - A. Bend tangent line
  - B. Setback
  - C. Base measurement
  - D. Thickness

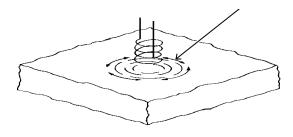


- 34. The radius of a bend plus the thickness of the metal describes the method of determining \_\_\_\_\_.
  - A. base measurements
  - B. radii
  - C. bend allowance
  - D. setback
- 35. In relation to the metal's grain direction, the possibility for cracks to develop increases when bending metal is at less than \_\_\_\_\_ degrees.
  - A. 30
  - B. 45
  - C. 70
  - D. 90
- 36. The stress and fatigue caused by vibrations on aircraft and equipment can lead to .
  - A. discomfort
  - B. blurred vision
  - C. component failure
  - D. loss of balance
- 37. An imbalanced condition is characterized by a vibration at \_\_\_\_\_.
  - A. once per revolution
  - B. blade-pass frequencies (2/rev, 3/rev, etc.)
  - C. rotational speed multiplied by number of blades
  - D. twice the rotational speed

38. What is used to increase the capability of components to tolerate misalignment?	42. Which effect on the body is not caused by high noise levels?
<ul><li>A. Accelerometer</li><li>B. Flexible coupling</li><li>C. Drive shaft</li><li>D. Shock mount</li></ul>	<ul><li>A. Lack of concentration</li><li>B. Shortness of breath</li><li>C. Nausea</li><li>D. Raise in blood cholesterol level</li></ul>
<ul><li>39. Repeated daily use of a chemical is best defined as exposure.</li><li>A. acute</li><li>B. chronic</li></ul>	<ul><li>43. The noise reduction rating (NRR) for a set of hearing protection is best defined as the</li><li>A. effectiveness of protection offered</li></ul>
C. chronograph D. dielectric	<ul><li>B. thickness of protection</li><li>C. tensile strength of the protection device</li><li>D. EPA requirement for noise</li></ul>
40. Who is responsible for ensuring that the guidelines of the Respiratory Protection Program are being followed?	abatement
<ul><li>A. The individual and the individual's supervisor</li><li>B. Safety officer</li></ul>	44. The current value that is usually fatal as a result of an electrical shock is milliamperes.
<ul><li>C. Hazmat officer</li><li>D. Quality assurance</li></ul>	A. 1 B. 4 C. 14 D. 140
41. When wearing an air-purification respirator you must ensure that it is used in areas where the oxygen concentration is percent.	
A. 7.5 B. 10 C. 14.9 D. 19.5	

#### APPENDIX A, PAMPHLET REVIEWW QUIZ

- 45. Which body organs are most sensitive to RF radiation?
  - A. Brain and Heart
  - B. Heart and Lungs
  - C. Eyes and Liver
  - D. Eyes and Testicles
- 46. What is the arrow identifying in the below diagram?



- A. Eddy currents
- B. Alternating current (AC)
- C. Coil
- D. Electron vortex

- 47. Which of the following describes the bridge circuit in an eddy current instrument?
  - A. Provides an alternating current or specified frequency range to the test coil
  - B. Serves to introduce a varying magnetic field into the part being inspected
  - C. Converts changes in eddy current magnitude and distribution into signals for subsequent processing and display
  - D. Suppresses unwanted signals from conditions for which inspection is not required
- 48. Which of the following describes a filtering signal processing circuit in an eddy current instrument?
  - A. Provides an alternating current or specified frequency range to the test coil
  - B. Serves to introduce a varying magnetic field into the part being inspected
  - C. Converts changes in eddy current magnitude and distribution into signals for subsequent processing and display
  - D. Suppresses unwanted signals from conditions for which inspection is not required

# APPENDIX A, PAMPHLET REVIEW QUIZ

49. Anytime an engine is disassembled, it should be	51. The transferring of metal from one surface to another is known as
A. water washed prior to	A. gouging
disassembling	B. galling
B. thoroughly cleaned before	C. erosion
inspecting components	D. material fallout
C. inspected for serviceability	
D. borescoped prior to	
disassembling	52. The dye penetrant method of performing a nondestructive inspection uses what type of light to improve the visibility
50. When marking parts that are directly	of the penetrant?
exposed to the engine gas path, you may use	-
	A. Neon
	B. Fluorescent
A. layout dye	C. Incandescent
B. pencil	D. Ultra-violet
C. grease pencil	
D. paint	

# APPENDIX A, PAMPHLET REVIEW QUIZ

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#### APPENDIX B, PHAMPHLET REVIEW QUIZ ANSWER KEY

/		
QUESTION	ANSWER	REFERENCE
1.	С	5.A.03c Pg. 4
2.	A	5.A.03c Pg. 10
3.	D	5.A.04c Pg. 13
4.	D	5.A.01 Pg. 3
5.	C	5.A.01 Pg. 7
6.	В	5.A.01 Pg. 7
7.	C	5.B.01c Pg. 3
8.	A	5.B.01c Pg. 4
9.	В	5.B.01c Pg. 10
10.	D	5.B.01c Pg. 14
11.	A	M13020.1 (series) Pg. 5-4
12.	В	M13020.1 (series) Pg. 5-4
13.	C	M13020.1 (series) Pg. 5-4
14.	C	5.B.GTG Pg. 3
15.	A	5.B.GTG Pg. 5
16.	A	5.B.GTG Pg. 8
17.	D	5.B.15 Pg. 10
18.	D	5.B.15 Pg. 10
19.	В	5.B.15 Pg. 3
20.	В	5.B.15 Pg. 3
21.	A	5.B.20 Pg. 6
22.	C	5.B.20 Pg. 13
23.	D	5.B.20 Pg. 14
24.	C	5.B.27 Pg. 3
25.	D	5.B.27 Pg.4
26.	D	5.B.27 Pg. 5
27.	D	5.B.27 Pg. 5
28.	D	5.B.27 Pg. 6

#### APPENDIX B, PHAMPHLET REVIEW QUIZ ANSWER KEY

QUESTION	ANSWER	REFERENCE
29.	A	5.B.29 Pg. 4
30.	D	5.B.29 Pg. 8
31.	D	5.B.29 Pg. 9
32.	C	5.B.29 Pg. 16
33.	В	5.B.29 Pg. 23
34.	D	5.B.29 Pg. 29
35.	В	5.B.29 Pg. 35
36.	C	5.B.30 Pg. 3
37.	A	5.B.30 Pg. 6
38.	В	5.B.30 Pg. 7
39.	В	5.D.01c Pg. 14
40.	A	5.D.01c Pg. 20
41.	D	5.D.01c Pg. 23
42.	В	5.D.01c Pg. 30
43.	A	5.D.01c Pg. 34
44.	D	5.D.01c Pg. 38
45.	D	5.D.01c Pg. 42
46.	A	5.D.01 Pg. 4
47.	C	5.D.01 Pg. 6
48.	D	5.D.01 Pg. 6
49.	C	5.D.04 Pg. 5
50.	A	5.D.04 Pg. 6
51.	В	5.D.04 Pg. 10
52.	D	5.D.04 Pg. 34

Publication Number	Publication Name
00-25-01	List Of Applicable Publications
1C-130A-23	System Peculiar Corrosion Control
1C-130A-3	Structural Repair Instruction
1C-130E-2-21JG-30-1	Air Conditioning Temperature Control
1C-130E-2-49FI-00-1	GTC Fault Isolation Manual
1C-130E-2-49JG-00-1-1	GTC Job Guide Manual
1C-130E-2-49JG-00-1-2	GTC Job Guide Manual
1C-130H-01	C-130 List Of Applicable Publications
1C-130H-10	Aircraft Power Package
1C-130H-2-00JG-00-1	Job Guide Index
1C-130H-2-12JG-10-2	Airplane Servicing
1C-130H-2-13	Airplane Wiring Diagram
1C-130H-2-2	Ground Handling, Servicing, and Airframe
	Maintenance
1C-130H-2-21FI-00-1-2	Temperature Control
1C-130H-2-21GS-00-1	Air Conditioning System
1C-130H-2-21JG-00-1	General Maintenance
1C-130H-2-21JG-10-1	Air Conditioning-Bleed Air
1C-130H-2-21JG-20-1	Air Conditioning-Distribution
1C-130H-2-21JG-30-1	Air Conditioning-Pressurization
1C-130H-2-21JG-40-1	Air Conditioning-Under Floor Heat
1C-130H-2-21JG-50-1	Airflow (AF 74-01658 and Up)
1C-130H-2-21JG-50-2	Airflow (Prior to AF74-01658)
1C-130H-2-21JG-60-1	Air Conditioning-Temperature Control
1C-130H-2-26FI-00-1	Fire Protection System
1C-130H-2-26JG-10-1	Fire Detection System
1C-130H-2-26JG-20-1	Fire Protection System
1C-130H-2-27FI (series)	Aileron Controls Fault Isolation

Publication Number	Publication Name
1C-130H-2-27GS (series)	Aileron Control General Systems
1C-130H-2-27JG (series)	Aileron Controls Job Guide
1C-130H-2-28FI (series)	Fuel System Fault Isolation
1C-130H-2-28GS (series)	Fuel System General Systems
1C-130H-2-28JG (series)	Fuel System Job Guide
1C-130H-2-29FI-00-1	Hydraulic Fault Isolation Manual
1C-130H-2-29GS-00-1	Hydraulic General Servicing
1C-130H-2-29JG-00-1-1	Hydraulic Job Guide Manual
1C-130H-2-29JG-00-1-2	Hydraulic Job Guide Manual
1C-130H-2-30FI-00-1-1	Ice and Rain Protection
1C-130H-2-30FI-00-1-2	Ice and Rain Protection
1C-130H-2-30JG-00-1	Ice and Rain Protection
1C-130H-2-32FI (series)	Main Landing Gear Fault Isolation
1C-130H-2-32GS (series)	Main Landing Gear General Systems
1C-130H-2-32JG (series)	Main Landing Gear Job Guides
1C-130H-2-35FI-00-1	Oxygen System
1C-130H-2-35GS-00-1	Oxygen System
1C-130H-2-35JG-00-1	Oxygen System
1C-130H-2-49-00-1-2	APU Job Guide Manual
1C-130H-2-49FI-00-1	APU Fault Isolation Manual
1C-130H-2-49GS-00-1	APU General Servicing
1C-130H-2-49JG-00-1-1	APU Job Guide Manual
1C-130H-2-56JG-00-1	Windows
1C-130H-2-61JG-10-1	Job Guide/Organizational Maint./Propeller
1C-130H-2-61JG-20-1	Propeller General System
1C-130H-2-7	Electrical Systems
1C-130H-2-70FI-00-1-1	Engine Fault Isolation Manual
1C-130H-2-70FI-00-1-2	Engine Fault Isolation Manual

	Publication Number Publication Name
1C-130H-2-70FI-1-2	Engine Fault Isolation Manual
1C-130H-2-70GS-00-1	Engine General Servicing
1C-130H-2-71JG-00-1	Powerplant Operating Limits & Checklist
1C-130H-2-71JG-00-2	Basic Engine
1C-130H-2-73JG-00-1	Engine Fuel
1C-130H-2-73JG-00-2	Basic Engine
1C-130H-2-73JG-00-2	Temperature Datum Control
1C-130H-2-75JG-00-1	Engine Air
1C-130H-2-75JG-00-1	Engine Fuel
1C-130H-2-76JG-00-1	Engine Controls
1C-130H-2-76JG-00-1	Engine Controls
1C-130H-2-77JG-00-1	Engine Indication
1C-130H-2-79JG-00-1	Engine Oil
1C-130H-2-80JG-00-1	Engine Starting and Ignition
1C-130H-4	Illustrated Parts Breakdown, C-130
1H-65A-01	List of Applicable Publications
1H-65A-11-72-11B-2	LTS-101 750B-2 Overhaul Manual
1H-65A-11-72-2B2	LTS-101-750B-2 Maintenance Manual
1H-65A-11-72-4B2	IPB LTS-101 750B-2
1H-65A-2-1	Maintenance Manual
1H-65A-2-2	Wiring Diagram Manual
1H-65A-2-3	Avionics System Maintenance Manual
1H-65A-3	Structural Repair Manual
1H-65A-4	Illustrated Parts Catalog
1U-25A-2	HU-25 Maintenance Manual
1U-25A-23	Corrosion Control Manual
1U-25A-2-9	Wiring Manual
1U-25A-3	Structural Repair Manual

Publication Number	Publication Name
1U-25A-4	Illustrated Parts Catalog
2J-ATF3-2-1	Light Engine Maintenance Manual
2J-ATF3-2-2	Engine Heavy Maintenance Manual
2J-ATF3-2-3	Engine Inspection/Repair Manual
2J-T56-44	Turboprop Engine Model T56-A-7B, T56-A-15 IPB
2J-T56-53	Turboprop Engine Models T56-A-7B
2J-T56-56	Intermediate Maintenance Turboprop Engine
	Models T56-A-7B, T56-A-15
A1-H60CA-140-100	Flight Control System Organ. Maint.
A1-H60CA-140-200	Flight Control Systems Testing & Troubleshooting
A1-H60CA-140-300	Flight Control Systems Organ. Maint.
A1-H60CA-140-400	Flight Control Systems Organ. Maint. with IPB
A1-H60CA-150-100	Rotors Systems Organ. Maint
A1-H60CA-150-400	Rotor Systems Organ. Maint. with IPB
A1-H60CA-220-100	Powerplant Systems
A1-H60CA-220-200	Powerplant Systems Testing & Troubleshooting
A1-H60CA-220-300	Powerplant Systems Organ. Maint.
A1-H60CA-220-400	Powerplant Systems Organ. Maint. with IPB
A1-H60CA-240-200	Auxiliary Power Unit (APU) Testing &
	Troubleshooting
A1-H60CA-240-300	Auxiliary Power Unit (APU) Organ. Maint.
A1-H60CA-240-400	Auxiliary Power Unit (APU) Organ. Maint. with IPB
A1-H60CA-260-100	Transmission Systems Organ. Maint.

Publication Number	Publication Name
A1-H60CA-260-200	Transmissions Systems Testing & Troubleshooting
A1-H60CA-260-300	Transmission Systems Maint. Procedures
A1-H60CA-260-400	Transmission Systems Organ. Maint. with IPB
A1-H60CA-450-200	Hydraulic Power Systems Testing &
	Troubleshooting
A1-H60CA-450-300	Hydraulic Power Systems Organ. Maint.
A1-H60CA-450-400	Hydraulic Power System Organ. Maint. with IPB
A1-H60CA-490-100	Utility Systems Organ. Maint.
A1-H60CA-490-200	Utility Systems Testing and Troubleshooting
A1-H60CA-490-300	Utility System Organ. Maint.
A1-H60CA-490-400	Utility System Organ. Maint with IPB
A1-H60CA-AML-000	Aircraft Documentation List
A1-H60CA-GAI-000	General Aircraft Information Organ. Maint.
A1-H60CA-SRM-300	Structural Repair Manual
A1-H60CA-WCR-00	Wiring Systems Repair Organ. Maint.
A1-H60HA-110-100	Airframe & Landing Gear System Organ. Maint
A1-H60HA-110-200	Airframe & Landing Gear Systems Testing &
	Troubleshooting
A1-H60HA-110-400	Powerplant Systems Organ. Maint. with IPB
A1-H60HA-410-100	Environmental Control Systems Organ. Maint.
A1-H60HA-410-200	Environmental Control Systems Testing
	Troubleshooting

Publication Number	Publication Name
A1-H60HA-410-300	Environmental Control Systems Organ.Maint.
A1-H60HA-410-400	Environmental Control Systems Organ Maint. with
	IPB
A1-H60HA-460-100	Fuel System Technical Manual
A1-H60HA-460-200	Fuel System Testing & Troubleshooting
A1-H60HA-460-300	Fuel System Organ. Maint.
A1-H60HA-460-400	Fuel System Organ. Maint. with IPB
A1-H60HA-510-200	Instrument Systems Organ. Maint.
A1-H60HA-510-300	Instrument Systems Organ Maint.
A1-H60HA-510-400	Instrument Systems Organ. Maint. with IPB
A1-H60HA-560-100	Flight References & Automatic Flight Control
	Systems Organ. Maint.
A1-H60HA-560-300	Flight References & Automatic Flight Control
	Systems Organ. Maint.
A1-H60HA-560-400	Flight References & Automatic Flight Control
	Organ. Maint. With IPB
A1-H60HA-750-300	Weapons Delivery System Organ. Maint.
A1-H60HA-SRM-000	Structural Repair Manual
A1-H60HA-SRM-300	Structural Repair Manual
A1-H60JA-WCR-000	Wiring Systems Repair
A1-H60JA-WDM-000	Wiring Data Manual Organ. Maint.
A1-T700A-IPB-400	Turboshaft Engines Models T700-GE-401 &
	T700A-GE-401C
A1-T700A-MMI-200	Turboshaft Engine Models T700-GE-401 &
	T700A-GE-401C

<b>Publication Number</b>	Publication Name
A1-T700A-MMI-210	Turboshaft Engine Models T700-GE-401 & T700-
	GE-401C
AC65-15A	Airframe and Powerplant Mechanics Airframe
	Handbook
AC65-9A	FAA Airframe and Powerplant Mechanics General
	Handbook
ACMS Index HC-130H	Maintenance Procedure Cards
ACMS Index HH-60J	Maintenance Procedure Cards
ACMS Index HH-65A	Maintenance Procedures Cards
ACMS Index HU-25A	Maintenance Procedure Cards
AFTO 1-1A-1	General Structural Repair
AFTO 1-1A-12	Fabrication, Maintenance and Repair of Transparent
	Plastics
AFTO 1-1A-14 (NAVAIR 01-1A-505)	Installation Practices for Aircraft Electric and
	Electronic Wiring
AFTO 1C-130A-3	Structural Repair Instructions
AFTO 2J-1-13	Cleaning of Gas Turbine Aircraft Engine and Parts
AFTO 33B-1-1 (NAVAIR 01-1A-16)	Nondestructive Inspection Methods
AFTO 33B2-7-11	Flaw Detector, Eddy Current Tester
AFTO 33B2-9-1	Eddy Current Tester
AFTO 42B5-1-2	Gas Cylinders (Storage Type) Use, Handling, and
	Maintenance
AFTO 4T-1-3	Inspection and Maint., Instructions, Storage &
	Disposition of Acft
AFTO 4W-1-61	All Type Acft. Tire Wheels-Maint. & O/H

<b>Publication Number</b>	Publication Name
AF Extension Course, 53153 03 7701	Airframe Repair Specialist: Fundamentals
Volume 2	of Metalworking
AF Extension Course, 53153 03 7701	Airframe Repair Specialist: Fundamentals
Volume 3	of Metalworking
CGTO PG-85-00-50	Technical Information Management and Ordering
	Systems (TIMOS)
COMDTINST M3710.1 (series)	Air Operations Manual
COMDTINST M10550.25 (series)	Electronics Manual
COMDTINST M11000.11 (series)	Civil Engineering Manual
COMDTINST M13020.1 (series)	Aeronautical Engineering Maintenance
	Management Manual
COMDTINST M13520.1 (series)	Aviation Life Support Systems Manual
COMDTINST M1414.8 (series)	Enlisted Qualifications Manual
COMDTINST M16478.1 (series)	Hazardous Waste Management Manual
COMDTINST M5100.47 (series)	Safety and Environmental Health Manual
COMDTINST M6000.3 (series)	First Aid and Health Lesson Plans
COMDTINST M6260.2 (series)	Technical Guide: Practices For Respiratory
	Protection
NAVAIR 01-1A-24	US Navy Helicopter Vibration Analysis
NAVAIR 01-1A-503	Maintenance of Aeronautical Anti-Friction Bearings
NAVAIR 01-1A-509 (AFTO 1-1-691)	Aircraft Weapons Systems Cleaning and Corrosion
	Control
NAVAIR 04-10-1	Acft. Wheels and Organization Inter & Depot
	Maint.

<b>Publication Number</b>	Publication Name
NAVAIR 04-10-506	Acft. Tubes and Tires
NAVAIR 11-100-1 (series)	General Use Cartridges, Cartridge Actuated Devices
	for Aircraft
NAVAIR 15-01-500	Preservation of Naval Aircraft
NAVAIR 16-1-540	Avionics Cleaning & Corrosion Control
	Organizational & Intermediate Maintenance
NAVAIR 17-15-50.1	Joint Oil Analysis Program
NAVEDTRA 12300	Aviation Machinist Mate 3&2
NAVEDTRA 12338	Aviation Structural Mechanic (H&S) 3&2
Seventh Edition	The Coast Guardsman's Manual

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#### APPENDIX D, STUDENT FEEDBACK FORM

**Instructions** Please use this form for any feedback you may have concerning this course. Submit your recommendations IAW instructions on page D-2. Note: Use the reverse side of this page if more space is

**How?** Note your suggestions, corrections, and comments below:

needed.

Page	Location on Page	Recommendations	

**Your Comments** If you were writing this pamphlet, what improvements would you make? What was good about it? What didn't you understand?

Please be specific in your comments/suggestions.

**To Contact You** Please provide the following information so that we can contact you if needed.

Name	Unit	Phone
		( )